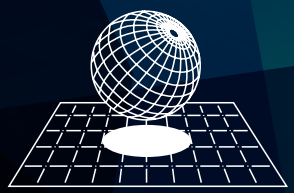


CIMNE

International Center
for Numerical Methods
in Engineering

2013

Centres de recerca
de Catalunya

# ACTIVITY REPORT
# 2013

# GOVERNING BODIES

## Governing Council

### PRESIDENT

Dr. Andreu Mas-Colell
Conseller d'Economia i Coneixement, GC [1]

### EXECUTIVE VICE-PRESIDENT

Dr. Eugenio Oñate
Catedràtic, UPC [2]

### MEMBERS

Dr. Enric Fossas
Rector, UPC

Sr. Pere Palacín
Direcció General d'Energia, Mines i Seguretat Industrial, GC

Dr. Lluís Ramallo
President Comissió Espanyola de la UNESCO

Dr. Benjamín Suárez
Catedràtic, UPC

Sr. Santi Vila
Conseller de Territori i Sostenibilitat, GC

## Executive Council

### PRESIDENT

Dr. Eugenio Oñate
UPC

### MEMBERS

Sr. Xavier Baulies
Departament de Territori i Sostenibilitat (TES), GC

Dr. Angel Cardama Aznar
UPC

Sra. Francisca García-Sicilia
UNESCO

Dr. Antonio Gens
UPC

Dr. Antonio Huerta
UPC

Dr. Juan Miquel
UPC

Dr. Sebastià Olivella
UPC

Dr. Fernando Orejas
UPC

Dr. Lluís Rovira
Institució CERCA [3], GC

Sra. Ana Simo
Centre d'Innovació Empresarial (ACC10), GC

Dr. Antoni Susin
UPC

Dr. Francesc Vallverdú
UPC

*[1] GC: Generalitat de Catalunya*
*[2] UPC: Universitat Politècnica de Catalunya*
*[3] CERCA: Centres de Recerca de Catalunya*

# Scientific Advisory Council

## CHAIRMAN OF SAC

Dr. Roger Owen
Swansea University, Swansea, UK

## MEMBERS

Dr. Eduardo Alonso
UPC

Dr. Manuel Casteleiro
Universidad de La Coruña

Dr. Alain Combescure
INSA, Lyon, France

Dr. Manuel Doblaré
Abengoa Research

Dr. Sergio Idelsohn
ICREA Research Professor at CIMNE

Dr. Michael Kleiber
Polish Academy of Sciences, Warsaw, Poland

Dr. Bernd Kröplin
TAO Gmb, Stuttgart, Germany

Dr. Rainald Löhner
George Mason University, Fairfax, USA

Dr. Antonio Marí
UPC

Dr. Xavier Oliver
UPC

Dr. Manolis Papadrakakis
National Technical University of Athens, Greece

Dr. Bernhard Schrefler
University of Padova, Italy

Dr. Honorio Sierra
Ph.D. in Naval Architecture

Dr. Peter Wriggers
Leibniz Universitaet Hannover, Germany

Scientific Advisory Council Meeting (February 6th, 2013)

*Sitting down (from left to right): B Schrefler,R. Löhner, R. Owen and P. Wriggers.*
*Standing up (from left to right): M. Casteleiro, M. Kleiber, X. Oliver, A. Combescure, M. Doblaré, E. Oñate, M. Papadrakakis, B. Kröplin and S. Idelsohn.*

# CONTENTS

# PRESENTATION

The International Center for Numerical Methods in Engineering (CIMNE) is a research organization created in 1987 at the heart of the prestigious Technical University of Catalonia (UPC) as a partnership between the Government of Catalonia and UPC. The aim of CIMNE is the development of numerical methods and computational techniques for advancing knowledge and technology in engineering and applied sciences.

CIMNE's headquarters are located at the Campus Nord of the Technical University of Catalonia (UPC) in Barcelona. CIMNE has also premises at different buildings in several campus of UPC. CIMNE has also offices in Spain in Madrid, Terrassa, Castelldefels and Ibiza. In 2005, CIMNE started its international expansion and since then has created the following international branches: CIMNE Latinamerica (Non profit Foundation in Santa Fe, Argentina); CIMNE USA (Non profit Corporation in Washington DC, USA); CIMNE Singapore (Non profit Corporation in Singapore) and CIMNE Beijing (China).

CIMNE employs some 250 scientists and engineers who work in the different offices of CIMNE around the world (Barcelona, Madrid, Washington DC [USA], Singapore, Santa Fe [Argentina], Beijing [China]). CIMNE has also established a network of 28 Classrooms and Joint Labs in partnership with Universities in Spain and 10 Latin American countries.

The research and technology development (RTD) activities of CIMNE cover a wide spectrum of topics ranging from classical engineering fields such as civil, mechanic, environmental, naval, marine and offshore, food, telecommunication and bio-medical engineering, computer sciences and applied sciences such as material sciences, bio-medicine, computational physics, nature, social and economic sciences and multimedia sciences, among others.

Since 1987, CIMNE has taken part in over 2000 RTD projects in cooperation with some 500 enterprises, universities and research centers worldwide.

The RTD activities of CIMNE are complemented by education and training activities via Master Courses, short courses and seminars and CIMNE Coffee Talks. CIMNE scientists supervise doctorate students in cooperation with several universities in Spain and worldwide.

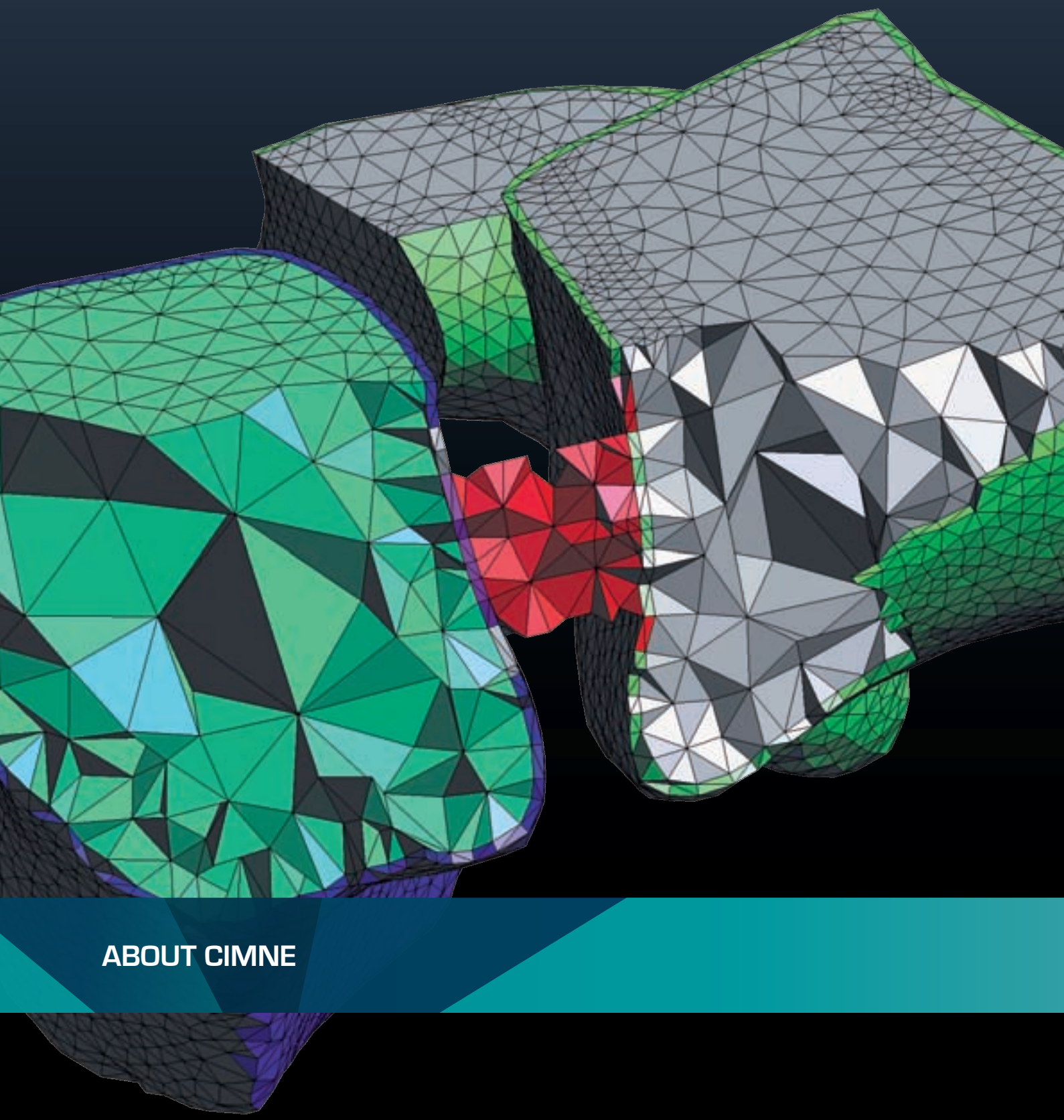
CIMNE publishes books, monographs, research reports and technical reports. CIMNE also organizes international conferences and workshops in the different areas of interest for CIMNE. It has organized 139 conferences since 1987.

CIMNE has a vocation for transferring the scientific and technical outputs from RTD projects to the industrial sector. This is effectively carried out in cooperation with companies from different sectors that exploit and market CIMNE technology. CIMNE has actively promoted the creation of 13 spin-off companies, some of them totally or partially owned by CIMNE, that play an important role in the industrialization and exploitation of CIMNE technology.

CIMNE maintains close cooperation links with many universities and RTD centers in the field of computational engineering and sciences worldwide. CIMNE has access to the computing facilities of several supercomputer centers in Spain and Europe.

CIMNE has been identified as one of the International Centers of Excellence on Simulation-Based Engineering and Sciences in a recent National Science Foundation (NSF) report [Glotzer et al., WTEC Panel Report on International Assessment of Research and Development in Simulation Based Engineering and Science. World Technology Evaluation Center (wtec.org), 2009].

The following sections briefly explain the activities of CIMNE on education, dissemination, research, development and technology transfer in 2013. Also the RTD lines of the CIMNE departments and the spin-off companies and products developed at CIMNE are described.



# ABOUT CIMNE

# A vocation for research and technology tranfer

## The Cycle of Ideas

The mission and activity of CIMNE can be clarified if we examine what we call the Cycle of Ideas[1]. Fig. 1 shows the scheme of the transit of an idea, from the instant it originates until it is transformed in an industrial and commercial success. Similarly to what it happens in biological and environmental cycles (the water cycle for instance), the cadencies and tempos are very important in the Cycle of Ideas.

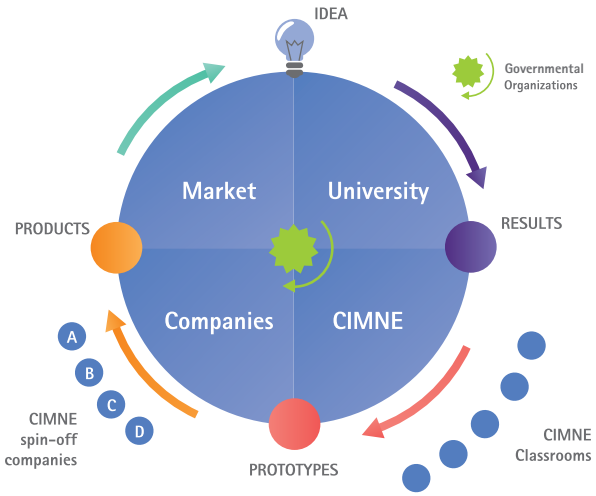



Fig 1. The Cycle of Ideas at CIMNE

Ideas (and here we refer to scientific advances) usually originate in university environments, where many professionals have the mission of studying, investigating and eventually discovering new areas of knowledge. The idea (the new discovery) would be equivalent to a seed, that even being very important it is far from becoming a fruit.

The idea matures in its "tour" by the first quadrant of the Cycle (the University) until it produces tangible results (thesis, papers, computer programs, physical devices, etc.). These "results", if they are not filed and protected, can be easily lost. This leads to undesirable repetitions or duplications.

What to do then with the results of an idea? The best is that they evolve until they reach the level of a prototype; i.e. something (a software code, a system, a device, etc.) that works in a contrastable manner. The transit of a result to a prototype demands an organization, efficient and capable staff and resources. What it is desirable is that the idea follows its route on specialized institutions, adjacent to the university, such as CIMNE, with the mission of transforming knowledge into tangible things (prototypes). The prototype develops into a product within a company. The cycle follows with the marketing of the product and ends up with the reinvestment of part of the revenues from the marketing activities in the development of new ideas.

1 Oñate, E. The Cycle of Ideas in Research, Development and Technology Transfer, PI 358, CIMNE, 2011

## Holistic view of CIMNE RTD activities

The overall research and technological development (RTD) activities of CIMNE has evolved over the years towards providing comprehensive solutions for solving problems that affect human beings. This can be achieved by integrating existing knowledge in a particular field with quantitative information emanating for prediction methods (i.e. computational-based techniques) and experimental measurements. The link between these four concepts: the problem to be solved, computational methods, experimental methods and existing knowledge is conceptually represented by the tetrahedron shown in Fig. 2 below.

Each of the nodes in the tetrahedron is connected to the other three by lines that represent information transfer pipelines (possibly internet). The intensity of the flow along the lines that interconnect two nodes will vary depending on the requirements for solving the problem.

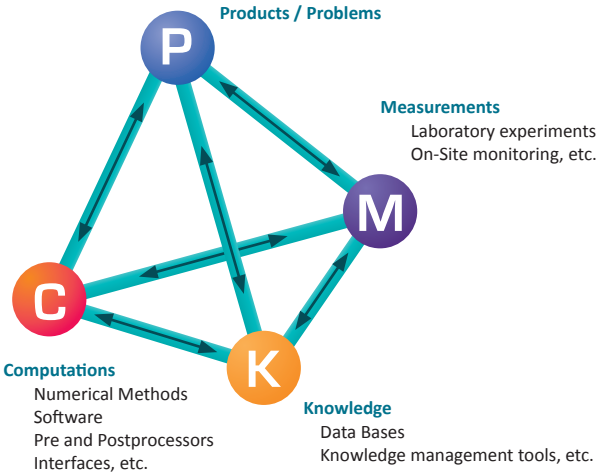


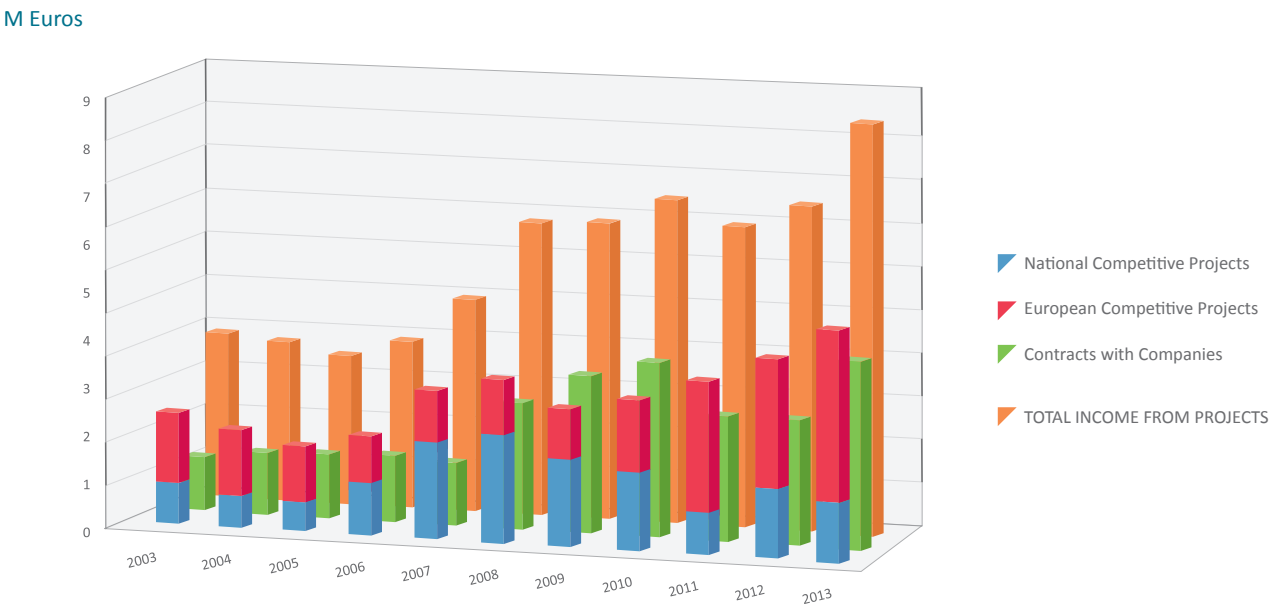

Fig 2. The holistic approach for solving problems at CIMNE

# CIMNE in few numbers

| | 2013 | From '87 |
|---|---|---|
| **Courses and Seminars** | 16 | **512** |
| **Congresses** | 17 | **139** |
| **Publications** | 34 | **1387** |
| Books | 10 | **141** |
| Monographs | 6 | **206** |
| Research Reports | 10 | **400** |
| Techincal Reports | 8 | **640** |
| Educational Programs | 0 | **15** |
| **Contracts with industry** | 106 | **1068** |

| | 2013 | From '87 |
|---|---|---|
| **Creation of new companies** | 2 | **13** |
| **Competitive Research Projects** | 77 | **657** |
| European Projects | 44 | **229** |
| National Projects | 32 | **421** |
| International Projects | 1 | **5** |
| **Staff** | 258 | |
| Post Doctoral Researchers | 46 | |
| Affiliated Scientists (UPC) | 23 | |
| RTD staff | 116 | |
| PhD Students | 38 | |
| Administration and services staff | 35 | |

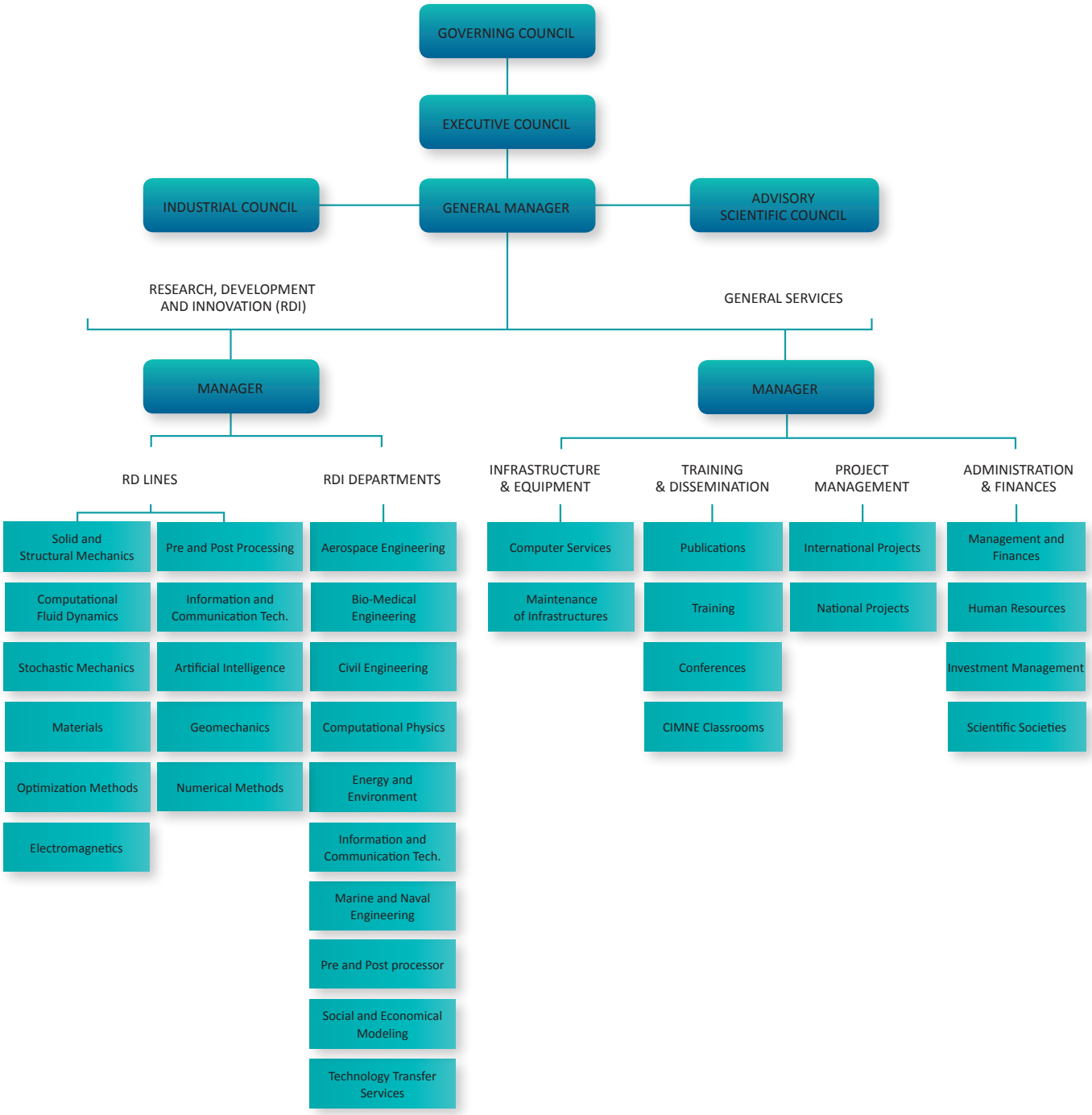
## Income from RTD projects



# Organization Chart

## Organization chart

The structure of CIMNE evolves in accordance with the following chart:



## DIRECTOR

Eugenio OÑATE

# Research Development and Innovation area

### RESEARCH STAFF

The number of scientists working at CIMNE in the period 1987-2013 and in 2013 is listed below, grouped by country of origin.

| | 2013 | 87-13 |
|---|---|---|
| Argentina | 8 | 60 |
| Australia | | 3 |
| Austria | | 2 |
| Belgium | | 5 |
| Bolivia | 1 | 4 |
| Brazil | 1 | 8 |
| Bulgaria | 1 | 1 |
| Chile | 3 | 9 |
| China | 1 | 9 |
| Colombia | 10 | 24 |
| Costa Rica | | 2 |
| Cuba | | 6 |
| Czech Republic | | 6 |
| Dominican Republic | 1 | 3 |
| Ecuador | 1 | 2 |
| Egypt | | 2 |
| Ethiopia | | 1 |
| France | 3 | 14 |

| | 2013 | 87-13 |
|---|---|---|
| Germany | 2 | 28 |
| Greece | | 3 |
| Holland | | 4 |
| Hungary | | 1 |
| India | 4 | 12 |
| Iran | 3 | 2 |
| Ireland | | 1 |
| Italy | 12 | 3 |
| Japan | | 4 |
| Korea | | 1 |
| Luxembourg | 1 | 1 |
| Mexico | 3 | 16 |
| Morocco | | 2 |
| Pakistan | 1 | 1 |
| Panama | | 1 |
| Peru | | 4 |
| Philippines | | 1 |
| Poland | | 3 |

| | 2013 | 87-13 |
|---|---|---|
| Portugal | | 2 |
| Romania | 2 | 6 |
| Russia | 1 | 1 |
| Salvadorian | 1 | 1 |
| Serbia | | 2 |
| Slovenia | 1 | 1 |
| Spain | 181 | 27 |
| Sweden | | 1 |
| Switzerland | | 1 |
| Thailandia | | 1 |
| Tunisia | | 1 |
| Turkey | 2 | 2 |
| United Kingdom | | 10 |
| United States | 2 | 3 |
| Uruguay | 1 | 2 |
| Venezuela | 2 | 6 |
| Vietnam | | 1 |
| TOTAL | 248 | 578 |

## SENIOR SCIENTISTS

IDELSOHN Sergio Rodolfo — Icrea Research Professor

PERIAUX Jacques Francis — UNESCO Prof. on Num. Met. Eng.

## AFFILIATED SCIENTISTS FROM TECHNICAL UNIVERSITY OF CATALONIA (UPC)

AGELET Carlos
ALONSO Eduardo
ARROYO Marino
BADIA Santiago
BARBAT Alejandro
BUGEDA Gabriel
CANTE Juan Carlos
CERVERA Luis Miguel
CHIUMENTI Michele
CODINA Ramón
DÍEZ Pedro
GARCIA Julio
GENS Antonio
HUERTA Antonio
LARESE Antonia
MIQUEL Juan
OLIVER Francisco Javier
OLLER Sergio
OÑATE Eugenio
PRINCIPE Ricardo Javier
RODRIGUEZ Antonio
SARRATE Josep
SUÁREZ Benjamín

## POST DOCTORAL RESEARCHERS

ARNAU Pedro Antonio
BAIGES Joan
CARBONELL Josep Mª
CARREÑO M. Liliana
CERROLAZA Miguel E.
DADVAND Pooyan
DANOV Stoyan V.
DE MEDINA Vicente C.
DI CAPUA Daniel
DI MARIANO Alessandra
FLORES Roberto Ma.
GAMBOA Gonzalo
GONZÁLEZ J. Manuel
GONZALEZ Claudia V.
HERNANDEZ Joaquin A.
HOFFMANN Christian A.
HUESPE Alfredo E.
KAMRAN Kazem
LLOBERAS Oriol
LUQUOT Linda
MAIDANA M. Augusto
MARTI Jaime E.
MARTI Julio M.
MARTÍN Alberto F.
MARTINEZ Xavier
MARULANDA Mabel C.
MORA Francisco J.
NADUKANDI Prashanth
OTIN Rubén
PINYOL Núria M.
PLANAS Ramón
PONS Jordi
RAMOS Anaïs
RASTELLINI Fernando G.
RODRÍGUEZ Alfonso
ROETTING Tobias
ROMERO Enrique E.
ROSSI Riccardo
RUIZ Eloi
RYZHAKOV Pavel
SALOMÓN R. Omar
SERRANO Armando J.
SERVÁN Borja
VARGAS Pablo Enrique
ZAMBRANO G. Eduardo
ZÁRATE Francisco

## RTD STAFF

AMAYA José Enmanuel
ANGELINI Massimo
BELLES Jordi
BELLES Xavier
BELLVER Carla
BENEDEK Tamas
BEZOS Víctor
BOGDAN Simon
BORDONE Maurizio
CALVO Luis
CARBAJOSA Jesus
CARBONELL Jordi
CARRASCO Javier
CELA DE LOS REYES Gustavo
CELIGUETA Miguel Angel
CERVELLÓ Josep
CHAVARRIAS Victor
CID Alexis
CIPRIANO Javier
CIPRIANO Jordi
COLL Abel
COMA Marti
CORTÉS Guillem Josep
CRIOLLO Rotman Alejandro
DAVIS France
DE POUPLANA Ignasi
DEU Amadeu
EL-GHAMRAWY Karim
ESCOLANO Enrique
FERNÁNDEZ Luis Jorge
FERRIZ Alberto
FRANZOLINI Pablo Martin
FREIXAS Genís
FRUITOS Oscar Alejandro
GÁLLIGO Juan José
GÁRATE Francisco Javier
GARCIA Daniel
GARCÍA María Olimpia
GHAZI Arash
GOMEZ Berta María
GONZÁLEZ Laura
GONZALEZ Nubia
GUERRA Enric
HAJIESMAILI Ehsan
HOSPITAL Raúl
IRAZABAL Joaquín
JEREZ Francesc
JIMENEZ Jordi
KULKARNI Rhushiket
LATORRE Juan Salvador
LICKO Igor
LIN Yiying
LLACAY Bàrbara
LLADÓ Gil
LOPEZ Merce
MAKHESH Manasseh Anand
MARI Andreu
MATÓ Susana
MELENDO Adrià
MIRÓ Jaume
MOLINER Jordi
MONACO Fernando
MONROS Anna
MOR Gerard Jordi
MORATA Miquel
NAVARRO Naeria
OLIVARES Gonzalo
OLM Marc
OÑATE IBAÑEZ José Luis
OTERO Fermin Enrique
PAIPURI Mahendra
PASENAU Miguel
PEFFER Gilbert
PÉREZ Jorge Suit
PÉREZ Daniel
PLANA Ana
PONT Arnau
PRIEGUE Angel Diego
RAGUÉS Laia
RENDA Fabio
RIBÉ Martí
RIERA Celia
ROCA Javier
RODRIGUEZ Juan Manuel
RODRIGUEZ Danny
ROIG Carlos Alejandro
ROSTOVANYI Maria
RUIZ Daniel
SALAZAR Fernando
SALICHS Sergi
SAMANTRAY Priyam
SAN MAURO Javier
SANTASUSANA Miquel
SANZ Marcos
SARDA Meritxell
SAU Núria
SCAMUZZI Marco
SOUDAH Eduardo
TAPIAS Mauricio Alberto
TARRACÓ Andreu
TARRAGÓ Daniel
TENA Alberto
TOPRAK Erdem
TOUS Javier
TRUCO Jordi
UBACH Pere-Andreu
VALERO Ignacio
VALERO Sergio
VALLDEPERAS Tomás
VANGAL Aditya
VELÁSQUEZ César Augusto
VILANOVA Ramón
VILLARRAGA Claudia Juliana
WANG Jiaxing
ZAVALA María Dolores
ZINGGERLING Claudio Miguel

## PHD STUDENTS

ABADIAS David
ARRUFAT Ferran
BARBOZA Ramón
BARBU Lucía Gratiela
BECKER Pablo Agustín
BENEDETTI Lorenzo
CAFIERO Mailhyn E.
CAICEDO Manuel Alejandro
CAMPÀ Francesc
CASAS Guillermo
COLOMES Josep Oriol
COMELLAS Ester
COTELA Jordi
DIALAMISHABANKAREH Narges
ESCUDERO Cuauhtemoc
ESPINOZA Héctor Gabriel
FERRER Àlex
FRANCI Alessandro
GARCIA María del Mar
GRAN Meritxell
GURKAN Ceren
HAMEED Muhammad Saqib
HIERRO Alba
JARAUTA Alexandre
LONDOÑO Juan Pablo
MANGADO Nerea
MAS Ricard
ORTEGA Enrique
PELÁEZ Ronny Rafael
RAMÓN Anna
SALGADO Mario Andrés
SAMAT Sergio
SCHEIBER Laura
SERRANO Alejandro
SERRI Victor
SOLER Joaquim
YERRO Alba
YUBERO María Teresa

## General services area

CIMNE's administration staff is specialized to cope with the increasing needs of CIMNE in a wide range of areas.

The following persons form the CIMNE's administration team:

### GENERAL SERVICES MANAGER

FONT Anna

### ADMINISTRATION AND FINANCES

LINARES Mª Carmen
CATALAN Valentín
DE LA ROSA Francisco José
LUQUE Cristina

### PROJECT MANAGEMENT

PÉREZ Sandra
DU PENHOAT Maëlle
CASANOVA Roger
CUADRAT Daniel
HERRERO Elena
MARTÍN Elena
SORIANO Cecilia
TRAVER Susanna

### CONGRESSES AND WORKSHOPS

FORACE Cristina
ARANDA Laia
BAZZANELLA Alessio
POTOKAR Iztok
SILHANKOVA Marcela

### DIRECTOR SECRETARY

ALBERICH Mercè

### SECRETARIAT AT CASTELLDEFELS

GARCIA Núria

### PUBLICATIONS

SAMPER Mª Jesús
LÓPEZ Sonia
ESCLUSA Clara

### CIMNE CLASSROOMS

GARCÍA-SICILIA Francisca
MORA Javier
SAGRISTÀ Sònia

### SYSTEMS

ALONSO Miguel
BURGOS Alberto
GARCÍA Daniel
LOZANO Joaquim
MOLL Felip

### MASTER COURSE

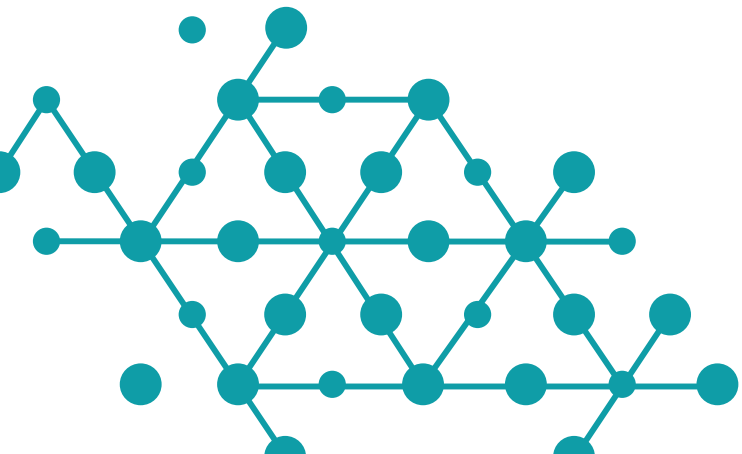
ZIELONKA Lelia
OLMEDO Angela
PÉREZ Cristina

### PERSONNEL

LINARES Merce
LATORRE Irene

### RECEPTION

JIMÉNEZ Mònica



## Visiting scientists

CIMNE promotes the visits of academics and researchers from around the world.

### LIST OF VISITING SCIENTISTS IN THE YEAR 2013:

*Estevam Barbosa Las Casas*
Universidade Federal de Minas Gerais, BRASIL

*Gustavo Buscaglia*
Instituto de Ciencias Matematicas e de Computaçao Univ. de Sao Paulo, BRASIL

*Manuel Casteleiro*
Universidad de La Coruña, ESPAÑA

*Miguel Cerrolaza*
Universidad Central de Venezuela, VENEZUELA

*Alain Combescure*
LaMCoS UMR CNRS 5259, FRANCE

*Martín A.Díaz*
Instituto Mexicano del Petróleo, MÉXICO

*Manuel Doblaré*
Abengoa Research, ESPAÑA

*Charbel Farhat*
Stanford University, Vivian Church Hoff Professor of Aircraft Structures, USA

*Carlos A.Felippa*
University of Colorado at Boulder, USA

*Michael Ghosn*
University of New York, USA

*Luis Godoy*
Universidad de Cordoba, Facultad de Ciencias Exactas, Físicas y Naturales (FCEFyN) de la UNC, ARGENTINA

*Felix Christian Guimaraes Santos*
Depto. Ingeniería Mecánica, Universidad Federal de Pernambuco, BRASIL

*Alfredo Huespe*
Intec, ARGENTINA

*Sergio Idelsohn*
Universidad Nacional del Litoral, Grupo de Tecnología Mecánica del INTEC, ARGENTINA

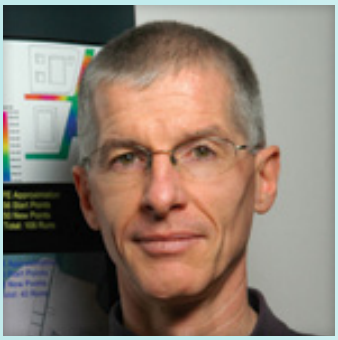
*Carlos Aníbal Juárez*
Universidad Centroamericana José Simeón Cañas (UCA), EL SALVADOR

*Michael Kleiber*
Institute of Fundamental Technological Research, Polish Academy of Sciences, POLAND

*Bernd Kröplin*
Institut für Statik und Dynamic der Luft-und Raumfahrtkonstruktionen (ISD), GERMANY

*Shihai Li*
Institute of Mechanics (IMECH), Chinese Academy of Sciences, CHINA

Prof. Bernd Kröplin



Prof. Rainald Löhner

Prof. Sergio Idelsohn


España
Washington DC
Cuba
Venezuela
El Salvador
Colombia
Brasil
Perú
Argentina
Santa Fe
Chile
Pekín
Singapore

# WHERE WE ARE

# Branches in Spain

## Background and location

The International Center for Numerical Methods in Engineering (CIMNE) was created in 1987 under the auspices of UNESCO by the Generalitat de Catalunya (the autonomous government of Catalonia). CIMNE has its own juridical status as a consortium between the Generalitat de Catalunya and the Universitat Politècnica de Catalunya (UPC).

The central offices of CIMNE cover an area of 800m$^2$ in one of the buildings of the North Campus of the UPC in the heart of the Escola Tècnica Superior d'Enginyers de Camins, Canals i Ports (School of Civil Engineering).

CIMNE also has offices in Terrassa, Madrid, Castelldefels, Ibiza, Washington, Beijing (China), Santa Fe, Singapore and space for RTD and training activities in the 28 CIMNE Classrooms distributed around the world.

CIMNE has a branch in the following Spanish cities:

BARCELONA — *Picture: Port of Barcelona*

MADRID — *Picture: Gardens of El Escorial, Madrid*

IBIZA — *Picture: Creek in Ibiza*

# CIMNE - BARCELONA

International Center for Numerical Methods in Engineering
The central office of CIMNE is in Barcelona, it was created in 1987. CIMNE - BARCELONA covers an area of 800m$^2$ in the North Campus of the UPC.

**CIMNE**
Edifici C-1, Campus Nord UPC - Gran Capità, s/n
08034 Barcelona, Spain
Tel. 34 - 93 205 70 16 - Fax 34 - 93 401 65 17
cimne@cimne.upc.edu - www.cimne.com

View of CIMNE - Barcelona building

Main entrance of CIMNE - Barcelona

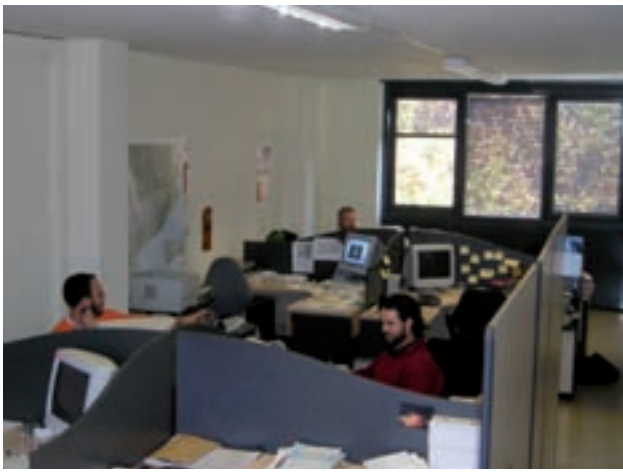
Reception

## CIMNE - TERRASSA

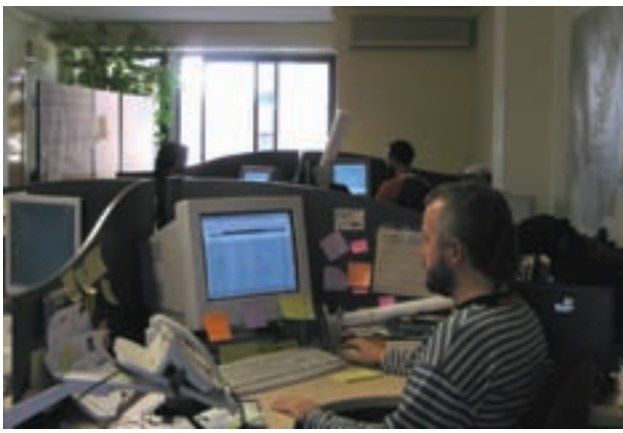
CIMNE - TERRASSA was created in 2001. CIMNE - TERRASSA covers an area of 150m$^2$ and houses the department of Building Energy and Environment (BeeGroup).

Edifici GAIA (TR14)
C/. Rambla Sant Nebridi 22
08222 Terrassa (Barcelona), Spain
Tel. 34 - 93 789 91 69
Fax. 34 - 93 788 31 10


Building housing Bee-Group in Terrassa



Working area



Working area

## CIMNE - MADRID

On May 2008 CIMNE inaugurated a new office in Madrid situated in the center of the city. It has 150m$^2$.

CIMNE - MADRID
Paseo General Martínez Campos nº41
28010 Madrid, Spain
Tel. 34 - 91 319 13 59

Working area

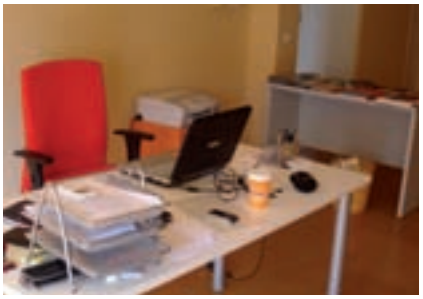
Reception - Entrance hall

Building

## CIMNE - IBIZA

In 2009 CIMNE inaugurated the CIMNE - IBIZA branch. It has 80m$^2$ and is located in city of Ibiza.

Bisbe Azara, nº4 3º-2ª
07800 Eivissa, Spain
Tel. 34 - 971 93 11 94



Working area

Ibiza beaches

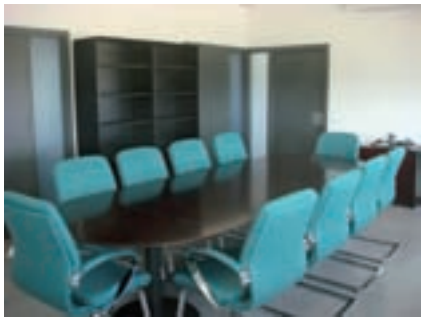
CIMNE - IBIZA Main entrance

## CIMNE - CASTELLDEFELS

CIMNE-CASTELLDEFELS was inaugurated on October 15th 2008. The facilities are located in the UPC Campus in Castelldefels. CIMNE premises represent some 1500m$^2$ in a new building constructed in collaboration with the UPC.

**CIMNE Castelldefels**
Campus del Baix Llobregat
Edifici C3, despatx 303, 3ºpl.
Esteve Terradas n. 5
08860 Castelldefels, Barcelona, Spain
Tel. 34 - 93 413 41 86

Classroom



Meeting room

Lounge

Main entrance of CIMNE Castelldefels


# International Branches

CIMNE has expanded its presence in different geographical areas in the world. The objective is to participate in international RTD projects in cooperation with research centers, universities and companies of different countries.

In the following lines we briefly present since recent experiences in the establishment of CIMNE in Latin America, USA, Singapore and China.

Washington, USA

China

Santa Fe, Argentina

Singapore

## CIMNE in Latin America

The presence of CIMNE in Latin America was initially implemented via the CIMNE Classroom Network. This network has 20 Classrooms in different Latin American countries (Argentina (5), Mexico (3), Brasil (2), Colombia (2), Cuba (1), Chile (1), El Salvador (1), Guatemala (1), Perú (1) and Venezuela (3)).

The formal establishment of CIMNE in Latin America was achieved by the creation of a Foundation to foster the activity of CIMNE in that region. The CIMNE-Latin American Foundation (FCL) is located in the city of Santa Fe (Argentina), the place where the first CIMNE Classroom in the Latin American region was created in cooperation with the National University of Litoral. The activity of CIMNE in the Latin American region is coordinated by Mr. Piazzese; Civil Engineer and CIMNE researcher from January 2002 to March 2007.

We list below the main projects carried out by FLC in the period 2011-2013:

### RTD PROJECTS

SADMA - Desarrollo de un sistema de apoyo a la decisión para monitorización y gestión sostenible de edificios históricos del patrimonio cultural usando nuevas tecnologías. Agencia Española de Cooperación Int. para el Desarrollo.
*01/01/2011 - 31/12/2011*

VIS - Estudios de vulnerabilidad por inundaciones en la región hidrográfica Mandinga-Comapala (El Salvador). Agencia Española de Cooperación Int. para el Desarrollo.
*01/01/2011 - 31/12/2011*

Humedal Cerrón Grande - Monitorización de variables físico-químicas en humedales RAMSAR de El Salvador. Proyecto financiado por la Universidad Centroamericana "José Simeón Cañas" (UCA).
*01/01/2013 – 31/12/2013*

AICA - Análisis de propagación de Inundaciones y diseño de un canal para conducción de agua para riego. Localidad de Avellaneda, Provincia de Santa Fe, Argentina.
Financiación privada.
*01/03/2013 - 30/07/2013*

EGO - Evaluación de gasoductos y oleoductos (Perú).
Convocatoria de presentación: Categoría 2, Proyectos de investigación y desarrollo tecnológico (I+D) 2011, Pontificia Universidad Católica del Perú (PUCP).
*01/01/2012 – 28/02/2013*

Arenales - Creación de un modelo hidráulico para el estudio de inundaciones del Río Arenales en un área urbana de la ciudad de Salta, Argentina.
*01/08/2012 – 31/03/2013*

GISG - Desarrollo de una metodología para la gestión de la integridad de sistemas de gasoductos (Perú)
Convocatoria de presentación: Categoría 2, Proyectos de investigación y desarrollo tecnológico (I+D) 2012, Pontificia Universidad Católica del Perú (PUCP).
*01/02/2013 – 31/01/2014*

Curso PASI-Red de Aulas CIMNE - Curso de Métodos Numéricos para Bioingeniería: "Numerical Methods and their Application in Bioengineering" (http://www.cimne.com/pasi). Financiado por la National Science Foundation – USA.
*18/02/2013-01/03/2013*

FCL meeting room

Javier Piazzese Director of FCL

# CIMNE in the US

CIMNE has developed a number of RTD projects funded by several US organizations such as the Interamerican Development Bank (BID), the World Bank and the Office for Naval Research, among others.

In 2010 CIMNE created a non-profit corporation named CIMNE-USA with the aim of fostering the scientific and technological activities of CIMNE in that country. The new organization is located at the city of Washington DC and is jointly directed by Mrs. Francisca García-Sicilia and Dr. Dave Cranmer. Mrs. García-Sicilia has been a director of international liaison activities in CIMNE for the last five years. Dr. Cranmer is a senior scientist of the National Institute of Standards and Technology (NIST) in the US and advisor of many companies.

In the period 2009-2013 CIMNE-USA has taken part in different RTD projects in the US in cooperation with universities, research centers and enterprises.

## SELECTED RTD PROJECTS

Study of the drillbit dynamics and the dynamics of cuttings transport in wellbones
Funded by Weatherford Ltd
*23/11/2011 - 23/11/2013*

WAM-V: ADVANCED NUMERICAL SIMULATION AND PERFORMANCE EVALUATION OF WAVE ADAPTIVE MODULAR VESSELS (WAM-V®) IN SPRAY GENERATING CONDITIONS
Funded by Office of Naval Research (ONR)
*01/07/2012 - 01/07/2013*

Meeting-room in CIMNE-USA

Dave Cranmer, Director of CIMNE-US

## CIMNE in Singapore

CIMNE has developed a close relationship with several RTD organizations in Singapore such as the Institute of High Performance Computing (IHPC). belonging to the A*Start National Agency of the Singapore Government. This relationship has lead to the signing of a cooperation agreement between CIMNE and IHPC aiming to the development of joint RTD projects.

Several visits and interchange have taken place from 2009 between scientists from CIMNE and IHPC. The visits have served for defining a number of RTD projects of interest to both organizations. We note the course on the use of the CIMNE codes GiD and Kratos taught at the IHPC premises on October 2009 by CIMNE scientists Abel Coll, Enrique Escolano and Pooyan Dadvand.

The increasing cooperation between CIMNE and IHPC has motivated CIMNE to create a new organization in Singapore, named CIMNE-Singapore, with the objective of fostering RTD activities and projects in the South East Asia region in cooperation with IHPC. The director of CIMNE-Singapore is Mr. Manuel Lopez a Naval Architect with wide experience in international projects.

We list below the main projects carried out by CIMNE in Singapore in the period 2010-2012:

### SELECTED RTD PROJECTS

NITTO - An integrated Software System for Modelling and Simulating Blood Flow in the Cardiovascular System to Determine the Mechanical Properties of the Vessel Walls.
NITTO DENKO
*01/12/2010 - 31/08/2011*

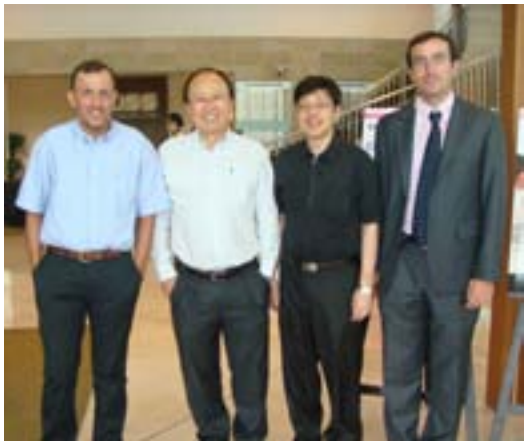
Development of numerical methods for fluid-structure interaction problems CIMNE - IHPC
*01/2009-12/2012*

### SELECTED ACTIVITIES

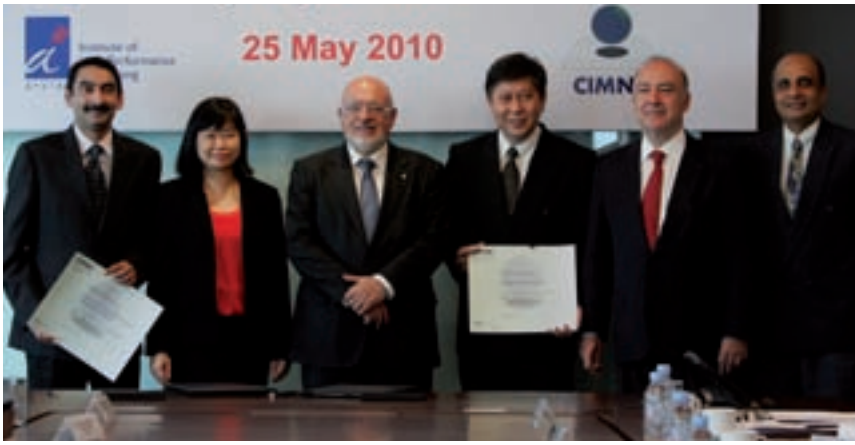
Organization of the International Workshop on Advances in Computational Methods for Fluid-Structure interaction
*27-29 April 2011, Singapore*

Support to the activities of the companies OMNI Ltd and Build Air Asia-Pacific Ltd.

Support to the activities of the company COMPASS Ingeniería y Sistemas SA and Build Air Asia-Pacific Ltd.



From left to right: Mr. Manuel López (Director of CIMNE-Singapore), Prof. Choo Yoo Sang (Director from Centre for Offshore Research & Engineering from UNS), Wang Chien Ming (Director Structures & Mechanics from UNS) and Mr. Pere-Andreu Ubach (CIMNE researcher)




Constitution of CIMNE Singapore at IHPC (May 2010)

# CIMNE in China

In 2006 CIMNE started a fruitful cooperation with the People's Republic of China. During these several years, CIMNE has developed a number of partnerships with some of the most renowned scientific Institutions in China, such as Beijing University, several research centers of the Chinese Academy and of Sciences or the Chinese Aeronautics Establishment.

Resulting from these partnerships, CIMNE has been engaged in a number of RTD projects. Supported by the 6th and 7th Frammework Programme of the EU, CIMNE has coordinated the European side of a series of projects aimed at promoting joint EU-China research on aeronautics. Financed by Chinese organizations, CIMNE has participated in research projects in areas of risk assessment of natural disasters.

In 2011, CIMNE promoted the creation of the CIMNE Beijing office in cooperation with Professor Mingwu Yuan of Beijing University and President of the International Chinese Association for Computational Mechanics. In 2013 the China office was officially established, directed by Ms Sònia Sagristà.

## SELECTED RTD PROJECTS

GRAIN 2: GReener Aeronautics International Networking 2
*October 2013 - October 2015*

Manipulation of Reynolds Stress for Separation Control and Drag Reduction (MARS)
*October 2010 - March 2014*

Casting of Large Titanium Structures (COLTS)
*October 2010 - September 2013*

Research of Prediction Theory and Numerical Analysis Methods for Severe Engineering Geological Disaster
*January 2010 - December 2015*

On the Development and Applications of Numerical Simulation Software for Ananlyzing Stability of Breakwaters and wave Loading
*May 2009 - May 2012*

## SELECTED ACTIVITIES:

TII Annual Conference 2014
China Access4EU Workshop: "Innovation Through Research: Sino-Erupean Cooperation in the Aeronautical Field"
Sònia Sagristà
*May, 7-9th, 2013*

Seminar at Tsinghua University
"Goal-oriented error estimation and adaptivity for structural mechanics and dynamics"
Dr. Pedro Díez
*May, 29th, 2013*

e-Infrastructures for e-Sciences 2013, CHAIN-REDS Workshop
"From Large Scale to Cloud Computing"
Dr. Pooyan Dadvand
*October, 22nd, 2013*

CO-DESIGN Annual Workshop 2013
"Exascale Computing Challenges in Engineering"
Dr. Pooyan Dadvand
*October, 31st, 2013*

Profs. Eugenio Oñate and Ming Wu Yuan in Beijing (May 2011)

Dr. P. Dadvand of CIMNE (second from the right) at the Co-Design Workshop, with organizers Prof. Mingwu Yuan and Tian Rong (October 31st, 2013)

Sònia Sagristà,
Director of CIMNE-Beijing

# CIMNE Classrooms and Joint Labs

The CIMNE Classrooms are physical spaces for cooperation in education, research and technological development (RTD) activities created jointly by CIMNE and one or several universities. The CIMNE Classrooms promote educational and training activities at graduate and postgraduate levels and the development of RTD projects in cooperation with companies.

The next page lists the CIMNE Classrooms created since 2000:


*Circles denote the countries where CIMNE-Classrooms have been created.*

## In Spain

### FERROL CLASSROOM – CIMNE (SPAIN)

Universidade da Coruña
Directors: Pablo Fariñas y Alfonso García
Created on: 29/January/2001
Activity: Application of numerical methods to problems related to marine engineering.

### EUETIB CLASSROOM – CIMNE (SPAIN)

Escuela Técnica de Ingeniería Industrial
Directors: Gabriel Bugeda y Daniel Di Capua
Created on: 18/July/2001
Activity: Simulation of sheet metal stampings, mold filling and structural calculations.

### UVA CLASSROOM – CIMNE (SPAIN)

Universidad de Valladolid
Director: Antonio Foces
Created on: 18/April/2002
Activity: Civil engineering projects, ports, marine, industrial, aerospace and architecture.

### FNB CLASSROOM – CIMNE (SPAIN)

Facultad de Náutica de Barcelona
Director: Julio García
Created on: 1/March/2002
Activity: Applications of numerical methods to problems related to marine engineering.

### UL CLASSROOM – CIMNE (SPAIN)

Universidad de Lleida
Directors: Manuel Ibáñez y Jordi Cipriano
Created on: 24/July/2004
Activity: Numerical methods applied to physics teaching buildings and renewable energy online.

### ETSEIAT CLASSROOM – CIMNE (SPAIN)

UPC deTerrassa
Director: Roberto Flores
Created on: 20/April/2007
Activity: Industrial and aeronautical engineering.

### CEAV CLASSROOM – CIMNE (SPAIN)

Centro de Estudios Avanzados
Director: Gabriel Molina
Created on: 16/October/2010
Activity: Environment, information and communication technology and tourism.

### UPM CLASSROOM - CIMNE (SPAIN)

Universidad Politécnica de Madrid
Director: Rafael Morán
Created on: 25/May/2010
Activity: Applications of numerical methods in civil engineering.

## In Latinamerica

### INA CLASSROOM – CIMNE (ARGENTINA)

Instituto Aeronáutico Universitario
Director: Carlos Sacco
Created on: 5/September/2002
Activity: Applications of numerical methods to problems related to fluid mechanics, structures, heat transfer, etc.

### FICH CLASSROOM – CIMNE (ARGENTINA)

Universidad Nacional del Litoral
Director: Sergio Idelsohn
Created on: 28/October/2002
Activity: Applications of numerical methods to problems related to water resources, mechanical engineering and computer engineering.

### UNT CLASSROOM – CIMNE (ARGENTINA)

Universidad Nacional de Tucumán
Director: Guillermo Etse
Created on: 01/November/2002
Activity: Development of computational models of bridges (degradation and repair mechanisms).

### UNSA CLASSROOM – CIMNE (ARGENTINA)

Universidad Nacional de Salta
Director: Dr. Liz Nallim
Created on: 10/April/2008
Activity: Development of computer models for application in civil engineering.

### UNER CLASSROOM – CIMNE (ARGENTINA)

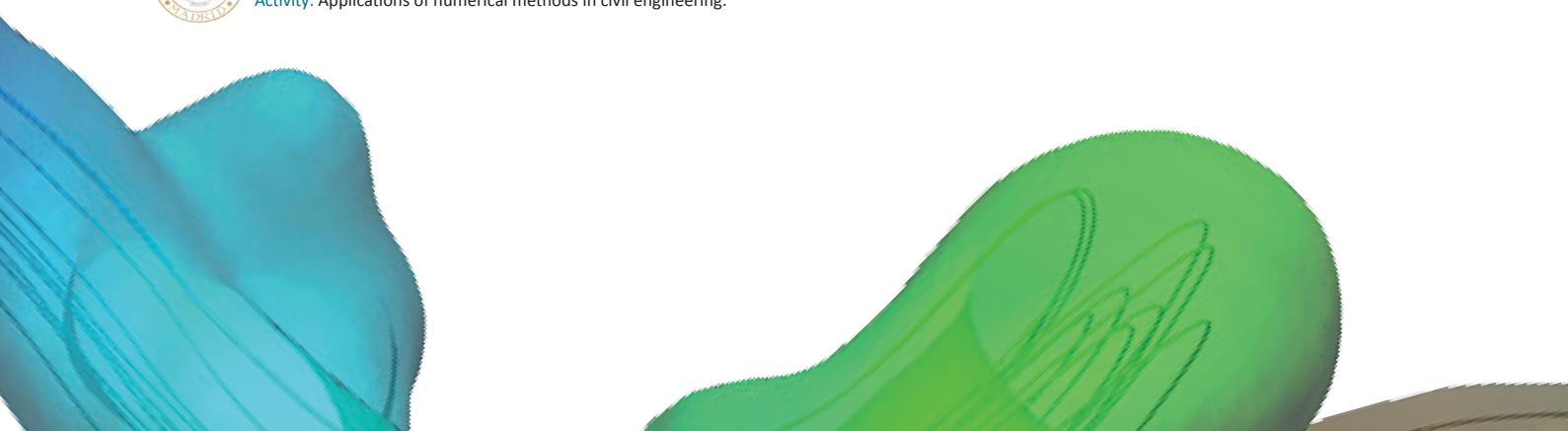
Universidad Nacional de Entre Ríos
Director: José Di Paolo
Created on: 14/March/2013
Activity: Applications of numerical methods to problems related to Bioengineering.

### FEMEC CLASSROOM – CIMNE (BRASIL)

Universidad Federal de Uberlândia
Director: Sonia Goulart
Created on: 25/April/2004
Activity: Applications related to the metal stamping process and mold design.

### IFSP CLASSROOM – CIMNE (BRASIL)

Instituto Federal de Educaçao, Ciéncia e Tecologia de Sao Paulo
Director: Écio Naves
Created on: 1/July/2009
Activity: Applications of numerical methods for solving engineering problems.



## UTFSM CLASSROOM – CIMNE (CHILE)

Universidad Técnica Federico Santa María
Director: Franco Perazzo
Created on: 05/March/2004
Activity: Numerical methods in mechanical engineering. Development of numerical methods.

## UNIANDES CLASSROOM – CIMNE (COLOMBIA)

Universidad de los Andes
Director: René Meziat
Created on: 24/January/2003
Activity: Teaching and research in numerical methods, optimization, variational principles and computational mechanics.

## UNC CLASSROOM – CIMNE (COLOMBIA)

Universidad Nacional de Colombia
Director: Jorge Hurtado
Created on: June/2005
Activity: Numerical methods applied to civil engineering.

## UCLV CLASSROOM – CIMNE (CUBA)

Centro de Investigación de métodos computacionales y numéricos en la ingeniería
Universidad Central de las Villas
Director: Carlos Recarey
Created on: 16/July/2003
Activity: Modeling and analysis of structures and grounds to the application of numerical methods.

## UCA CLASSROOM – CIMNE (EL SALVADOR)

Universidad Centroamericana "José Simeón Cañas" UCA
Director: Mauricio Pohl
Created on: 12/February/2010
Activity: Civil engineering applications and multi objective optimization and applications.

## UMG CLASSROOM – CIMNE (GUATEMALA)

Universidad Mariano Gálvez
Director: Rolando Torres Salazar
Created on: 01/February/2011
Activity: Development of computer models for application in civil engineering.

## UGTO CLASSROOM – CIMNE (MEXICO)

Universidad de Guanajuato
Director: Jesus Gerardo Valdes
Created on: 16/January/2002
Activity: Civil engineering applications and multi objective optimization and applications.

## ITESM CLASSROOM – CIMNE (MEXICO)

Instituto Tecnológico de Estudios Superiores de Monterrey
Director: Sergio Gallegos
Created on: 18/May/2009
Activity: Applications of numerical methods in civil engineering.

## CIMAT CLASSROOM – CIMNE (MEXICO)

Centro de Investigaciones en Matematicas
Director: Miguel Angel Moreles
Created on: 26/June/2006
Activity: Applied mathematics, numerical methods, engineering and statistical analysis.

## PUCP CLASSROOM – CIMNE (PERU)

Universidad Católica de Perú
Directors: Quino Valverde y Salvador Botello
Created on: 16/April/2009
Activity: Modeling and analysis of structures and grounds to the application of numerical methods.

## INABIOX CLASSROOM – CIMNE (VENEZUELA)

Universidad Central de Venezuela
Director: Miguel Cerrolaza
Created on: 15/February/2004
Activity: Applications of numerical methods to problems related to Bioengineering.

## UCLA CLASSROOM – CIMNE (VENEZUELA)

Universidad Centrooccidental "Lisandro Alvaro" (UCLA)
Director: Juan Carlos Vielma Pérez
Created on: 20/October/2008
Activity: Applications of numerical methods to civil engineering problems.

## UC CLASSROOM – CIMNE (VENEZUELA)

Universidad de Carabobo
Director: David Ojeda
Created on: 29/April/2009
Activity: Applications of numerical methods in optimization and inverse problems in engineering failure analysis.

*For more information visit: http://www.cimne.com/cdl1/vpage/2/1115/Classrooms-and-Joint-Labs*

## CIMNE Classrooms Meetings

### GENERAL MEETINGS OF THE CIMNE CLASSROOM NETWORK, UPC

1st Meeting, Barcelona 2004

2nd Meeting, Santa Fe (Argentina) 2006

3rd Meeting, Barcelona 2007

4th Meeting, Barcelona 2009

5th Meeting, Guanajuato (México) 2013


*Fifth General Meeting of the AULAS CIMNE Network (Guanajuato, México, 4-5 November 2013)*

## Thematic conferences

### 1ST SEMINAR ON BIOENGINEERING OF THE CIMNE CLASSROOMS

Mérida, Venezuela, March 2010


### 2ND SEMINAR OF THE CIMNE CLASSROOMS

Salta, Argentina, November 2012

Prof. O. C. Zienkiewicz,
fisrt UNESCO Professor on NME

Prof. J. Périaux,
current UNESCO Professor on NME

## Unesco Chair on Numerical Methods in Engineering

### www.cimne.com/unesco/

The creation of CIMNE was sponsored by UNESCO, aiming to promote international cooperation and development in the field of the application of numerical methods in science and technology.

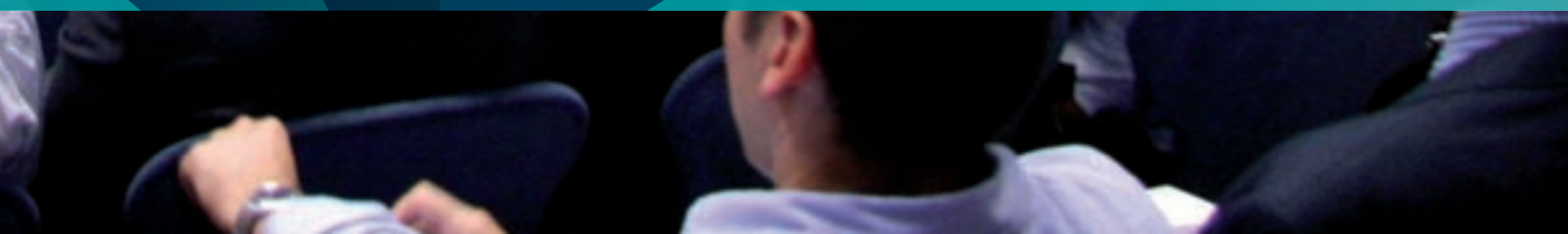
As a result of the cooperation between UNESCO and CIMNE, in 1989 the UNESCO Chair on Numerical Methods in Engineering was created at the Universitat Politècnica de Catalunya (UPC) with the support of the Generalitat de Catalunya. This was the first UNESCO Chair in the world.

Prof. O. C. Zienkiewicz held the UNESCO Chair since its creation in 1989 until his death on January 2nd, 2009.

In 2009 the Unesco Chair of Numerical Methods in Engineering was awarded to Dr. Jacques Périaux. He is a recognized expert in the field of numerical methods applied to aerospace engineering. Dr Périaux contributions have resulted in a significant increase in the RTD activities of CIMNE in the aerospace sector, in particular with academic organizations and industry in China, the organization of numerous training courses, exchanges with leading scientists worldwide and several RTD projects at international level.

### Meeting of the Unesco Chairs established in Spain at UPC. Barcelona, December 2011


# TRAINING AND DISSEMINATION



# Courses and Seminars

## Courses

CIMNE regularly organises courses and seminars related to the theory and application of numerical methods in engineering. The courses are addressed to recent university graduates and professionals from schools of engineering and applied sciences universities.

In 2013 CIMNE has organised the following courses and seminars:

*Master of Science in Computational Mechanics*
October 2013

*Cálculo de Estructuras por el Método de Elementos Finitos*
March 2013

*Curso de Máster en Métodos Numéricos Para Cálculo y Diseño en Ingeniería*
July 2013

*Master on Numerical Methods in Engineering*
September 2013

*Simulation in Engineering and Entreprenership Doctorate - SEED*
October 2013

*COMPLAS short Course*
September 2013

### VIRTUAL LEARNING CENTRE

CIMNE has developed a web environment for distance learning education via Internet. The Virtual Center for continuous education of CIMNE allows the interaction between students and educators in courses via Internet.

The Virtual Center of CIMNE is useful in gathering information early on in a course to facilitate the registration process. Teachers can also follow the student progress and carry out the different tutorials and exercises.

The Virtual Center operates 24 hours a day to channel all relationships between students, educators, and administrators involved in the course.

Through the Virtual Center of CIMNE students can access the latest information on the various courses and any other academic or administrative matters related to the course.

The Virtual Center of CIMNE hosts the Master Course in Numerical Methods in Engineering and other postgraduate courses of CIMNE.

## Seminars

Towards the industrialisation of high-order methods for CFD and CEM
Prof. Rubén Sevilla
*30/10/13*

Modeling of the press hardening process and its applications
Prof. Mats Oldenburg
*16/10/13*

Parametric and stochastic Problems - an Overview of Computational Methods
Prof. Hermann G. Matthies
*8/10/13*

Efectos de fuego y explosiones sobre estructuras en la industria del petróleo
Prof. Luis A. Godoy
*10/09/13*

Necesidad de los métodos experimentales y numéricos en ingeniería de presas
Prof. Miguel Ángel Toledo
*9/07/13*

Polymer Electrolyte Fuel Cells Fabrication, Characterization and Mathematical Modelling
Marc Secanell
*22/05/13*

Application of inverse problems techniques for aerospace engineering (review of thirty years activities in Moscow Aviation Institute)
Dr. Aleksey V. Nenarokomov
*20/02/2013*

X-FEM modeling of polyurea-based composites
Prof. Zhanli Liu
*30/01/13*

Computation model on dislocation-based crystal plasticity at sub-micron scale
Prof. Zhuo Zhuang
*1/02/13*

Mixed problems and the (in)famous inf-sup condition
Prof. Gustavo Buscaglia
*17/01/13*

# CIMNE Coffee Talks

The CIMNE Coffee Talks are seminars of one hour organized by CIMNE researches. Each talk opens with a welcome coffee and ends up with an open discussion on the content of the talk.

Multiscale domain decomposition analysis of quasi-brittle materials
Oriol Lloberas-Valls
*11/12/13*

Desarrollo de arquitectura Big Data para el almacenaje y análisis estadístico de grandes cantidades de datos relacionados con consumos eléctricos domésticos
Oriol Rius y Fabio Renda
*4/12/13*

A unified stabilized Lagrangian formulation for fluid-structure interaction problems using PFEM
Alessandro Franci
*13/11/13*

Acoplamiento FEM-DEM en el análisis de fracturas
Francisco Zarate
*22/10/13*

Learning Layers: Mejorando el aprendizaje informal entre PyMES que compiten
Pablo Franzolini
*16/10/13*

Hierarchical multiscale optimization of the microstructure arrangement and the macroscopic topology in computational material design
Alex Ferrer
*25/09/13*

Modeling of Pedestrian Motion
Rainald Lohner
*10/07/13*

WatDis: Diseño inteligente de Redes de Abastecimiento de Agua
Marcelino Rodríguez
*3/07/13*

e-Motion Modelo de Coaching
Pablo Franzolini
*26/06/13*

ADRC tuning employing the LQR approach for decoupling uncertain MIMO systems
Pedro Antonio
*22/05/13*

Efficient Programming: Design (Part II)
Pooyan Dadvand y Miguel Pasenau
*15/05/13*

Efficient programming
Pooyan Dadvand y Miguel Pasenau
*8/05/13*

Stepwise advancing strategy for the simulation of fatigue problems
Lucia-Gratiela Barbu
*17/04/13*

RMOP, optimization from industrial to Research applications
Hector Espinoza, Martí Coma y Jordi Pons
*3/04/13*

ARBOL SABIO. Transformando la Educación hacia la Excelencia
Jorge Serrano y Lita Muñoz
*20/03/13*

Ingeniería fluvial y desarrollo sostenible
Josep Dolz
*13/03/13*

Curso en creación de 'problem types' de GiD y detalles de personalización
Enrique Escolano
*6/03/13*

Modelos reducidos de aliviaderos de presas: aliviaderos escalonados
Martí Sanchez
*26/02/13*

Tendencias del mercado en software de simulación numérica: la visión de un ingeniero consultor del sector automoción
Blai Sorita
*13/02/13*

La modelización numérica en Dinámica Fluvial: el proyecto Iber
Ernest Bladé
*6/02/13*

Do theoretical Flops matter for real applications performance?
Joshua Mora
*30/02/13*

Fabricación de piezas de caucho: modelado y simulación utilizando OpenFOAM
Pablo Caron
*16/01/13*

# Conferences and workshops

Since 1987 CIMNE has organised 139 conferences on different topics of numerical methods and their applications in engineering and applied sciences.

## Conferences in 2013

### PASI 2013


PASI - Numerical Methods and their Applications in Bioengineering
*February 18 - March 1, 2013, Paraná, Argentina*

### Advances in Computational Mechanics (ACM 2013)

A Conference Celebrating the 70th Birthday of Thomas J.R. Hughes
*24-27 February, 2013, San Diego, California, USA*

### FRAMCOS-8

8th. International Conference on Fracture Mechanics of Concrete and Concrete Structures
*10 - 14 March, 2013, Toledo, Spain*

### 30 GEF

30 Encuentro del Grupo Español de Fractura
*March 13 al 15 2013, Toledo, Spain*

### MARINE 2013


V International Conference on Computational Methods in Marine Engineering
*29 - 30 May 2013, Hamburg, Germany*

### ADMOS 2013

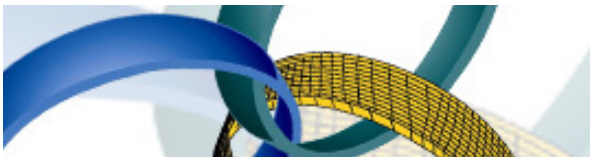
International Conference on Adaptive Modeling and Simulation
*June 3 - 5, 2013, Lisbon, Portugal*

## Conferences in 2013

### TALUDES Y LADERAS INESTABLES

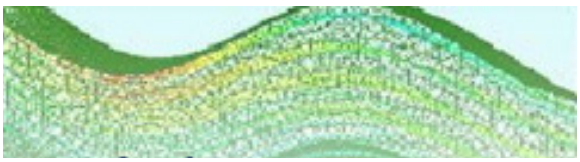
VIII Simposio Nacional sobre Taludes y Laderas Inestables
*J11 al 14 de June 2013, Palma de Mallorca, Spain*

### COUPLED PROBLEMS 2013



V International Conference on Coupled Problems in Science and Engineering
*June 17 - 19, 2013, Ibiza, Spain*

### CMN 2013



Congreso de Métodos Numéricos en Ingeniería
*25 - 28 June 2013, Bilbao, España*

### EUCASS 2013

5th European Conference for Aerospace Sciences
*9 - 11 October 2013, Munich, Germany*

### COMPLAS COURSE 2013

COMPLAS Short Course
*September 2 - 3, 2013, Barcelona, Spain*

### COMPLAS XII

XII International Conference on Computational Plasticity
*September 3 - 5, 2013, Barcelona, Spain*

### PARTICLES 2013

III International Conference on Particle-based Methods
*18 - 20 September 2013, Stuttgart, Germany*

For more information please visit our website:
www.cimne.com

## Conferences in 2013

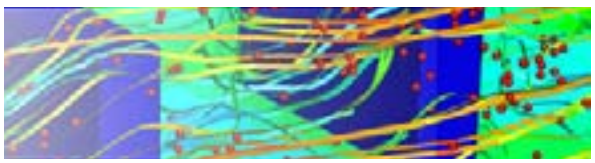
### STRUCTURAL MEMBRANES 2013

VI International Conference on Textile Composites and Inflatable Structures
*9 - 11 October 2013, Munich, Germany*

### IEcat

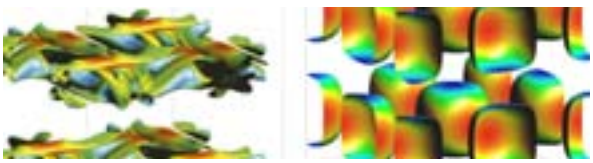
Jornada de treball sobre innovació en l'edificació a Catalunya
*31 October 2013, Barcelona, Spain*

### CMMBI SCHOOL



School on Computational Mechanics for Moving Boundaries and Interfaces
*14-17 October 2013, Barcelona, Spain*

### VMS 2013



Variational Multiscale and Stabilized Finite Elements
*6-8 November 2013, Barcelona, Spain*

## Conferences planned for 2014-15

### IABSE Symposium 2014

International Association for Bridge and Structural Engineering
*September 2014, Madrid, Spain*

### 6th WCSCM


6th World Conference on Structural Control and Monitoring
*15 - 17 July 2014, Barcelona, Spain*

### WCCM XI — ECCM V — ECFD VI

Joint Organization of
11th. World Congress on Computational Mechanics
5th. European Conference on Computational Mechanics
6th. European Conference on Computational Fluid Dynamics
*20-25 July 2014, Barcelona, Spain*

### PANACM 2015

1st Pan-American Congress on Computational Mechanics -
*27 - 29 April 2015, Buenos Aires, Argentina*

## Conferences planned for 2014-2015

### 7th GiD Convention

7th Convention on Advances and Applications of GiD
*17 - 18 July, 2014, Barcelona, Spain*

### COUPLED PROBLEMS 2015

VI International Conference on Coupled Problems in Science and Engineering
*18 - 20 May, 2015, Venice, Italy*

### STRUCTURAL MEMBRANES 2015

VII International Conference on Textile Composites and Inflatable Structures
*19 - 21 October, 2015, Barcelona, Spain*

### MARINE 2015

VI International Conference on Computational Methods in Marine Engineering
*15 - 17 June 2015, Rome, Italy*

### COMPLAS XIII

XIII International Conference on Computational Plasticity
*1 - 3 September, 2015, Barcelona, Spain*

### PARTICLES 2015

IV International Conference on Particle-based Methods
*28 - 30 September, 2015, Barcelona, Spain*

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# Publications

CIMNE publishes books, journals, monographs, scientific reports and educational software on the theory and applications of numerical methods in engineering and applied science.

The publications of CIMNE can be visited and ordered via Internet in www.cimne.com. Most publications can be freely downloaded from the web.

We list below the publications of CIMNE in 2013:

## Books

L108b, *E. Oñate*, Structural analysis with the finite element method. Linear statics, 2013

L132, *M. Bisschof, R. Ekkehard, E. Oñate, O. D. R. Jones, P. Wriggers,* Particle-based Methods III, Fundamentals and Applications

L133, *J. A. Hernández Ortega*, Teoría de Estructuras

L134, *S. Idelsohn, M. Papadrakakis, B. Schrefler*, Computational Methods For Coupled Problems In Science And Engineering V (COUPLED 2013)

L135, *J.P. Mointinho de Almeida, P. Díez, C. Tiago, N. Parés*, Adaptive Modeling and Simulation 2013 - Admos 2013

L136, *M. de Almeida, JP, P. Diez, C. Tiago and N. Pares,* Adaptive modeling and simulation 2013 - ADMOS 2013

L137, *K.-U. Bletzinger, B. Kröplin, E. Oñate,* Structural Membranes 2013. VI International Conference On Textile Composites And Inflatable Structures

L138, *S. Idelsohn, M. Papadrakakis, B. Schrefler*, Computational methods for coupled problems in scince and engineering V (COUPLED 2013)

L139, *B. Brinkmann, P. Wriggers,* MARINE 2013. Computational Methods in Marine Engineering V

L140, *O. J. Haidn, W. Zinner and M. Calabro*, EUCASS 2013, 5th European Conference For Aeronautics And Space Sciences

## Journals

Revista internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería. Editores: E. Oñate y S. R. Idelsohn, Vol. 29 nº1, 2, 3, 4, Elsevier, 2013

Archives of Computational Methods in Engineering. Editors: M. Kleiber and E. Oñate, Vol. 20 nº1,2,3,4 Springer, 2013


## Monographs

M135, *J.M. Ortolano, J.A. Hernández, J. Oliver,* A comparative study on homogenization strategies for multi-scale analysis of materials

M136, *H. Yervilla, L. González, A. Recarey,* Algoritmos de pre y post proceso para métodos numéricos de puntos, métodos de partículas y libres de malla

M137, *E. Soudah, M. Bordone, N.Y. Kwee, T.H. Loong, C.H. Tan, P. Uei, N. Sriram,* Mechanistic and pathological study of the genesis, growth, and rupture of abdominal aortic aneurysms

M138, *R. Morán, M.A. Toledo,* Investigacion sobre el diseño de protecciones tipo repié para evitar el deslizamiento en masa de presas de escollera sometidas a perculaciones extremas

M139, *D.F. Mora, X. oliver, A. Huespe,* Multified-based modeling of material failure in high performance reinforced cementitious composites

M140, *V.S.A. Monteiro, E. Oñate, S. Oller,* Computational model of the human urinary blader

## Research reports

*PI391,* A local constitutive model for the discrete element method, E. Oñate

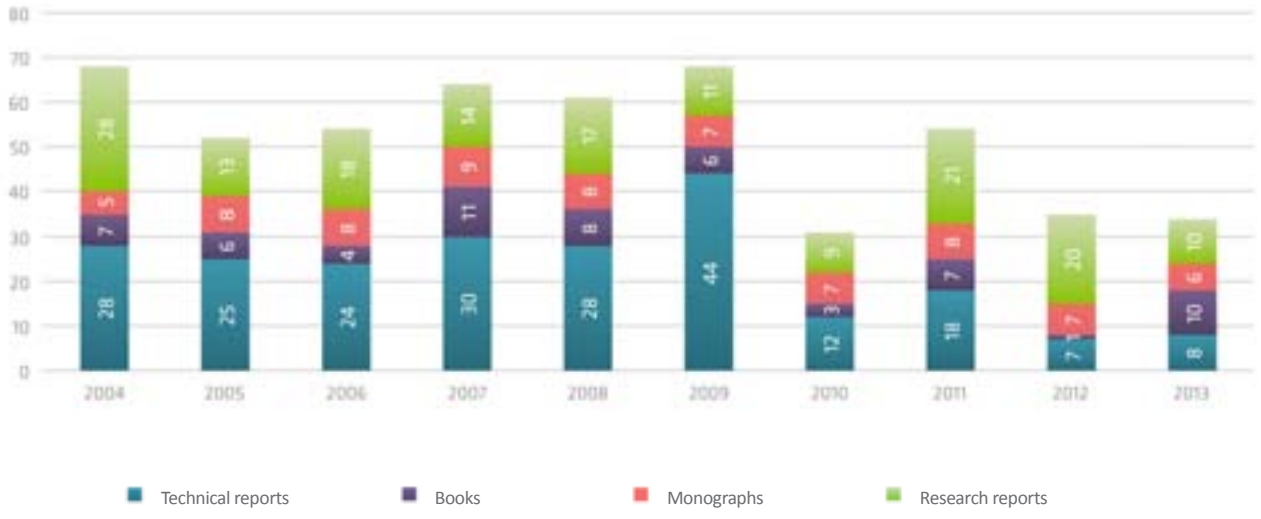
*PI392,* Modelling and simulation of particulate flows with the particle finite element method, E. Oñate

*PI393,* Updated lagrangian finite element formulation for quasi and full incompressibe fluid, E. Oñate

*PI395,* Analysis of the melting, burning and flame spread of polymers with the particle finite element method, E. Oñate, J. Martí, P. Ryzhakov, R. Rossi, S. R. Idelsohn

*PI396,* El papel de los modelos numéricos en la investigación y el diseño de aliviaderos de presas, F. Salazar, A. Larese, R. Rossi, E. Oñate, R. Morán, M.A. Toledo

*PI397,* Study of composite materials using zigzag theory on Timoshenko beams, M. Masó, E. Oñate, F. Zarate



*PI398,* Dessarrollo y aplicación de un modelo de elementos finitos para cálculo de vigas con materiales compuestos laminados basado en la teoría de Timoshenko, A. Llanos, E.Oñate, F. Zarate

*PI399,* On the arc length method: Combining ideas and implementation aspects, N.M. Lafontaine, X.R. Wang, K.F. Huang, M.W. Yuan, E. Oñate

*PI400,* Unified Lagrangian formulation for analysis of fluid-structure interaction problems, A.Franci, E. Oñate, J.M. Carbonell

*PI402,* On the effect of the bulk tangent matrix in the analysis of free surface lagrangian flows using PFEM

## Technical reports

*IT633* Description and user guide of Ermes V7.0, R. Otin

*IT634* Simulation of the transport of cutting in wellbores using the particle finite element method, M.A. Celigueta, S. Latorre, Pere A. Ubach, J. Miquel, E. Oñate, V. Gandikota, K. Deshpande

*IT635* Validation of DEM constitutive model for cement and concrete material samples, E. Oñate, F. Arrufat, F. Zárate, P.A. Ubach, V. Gandikota, L. Ring

*IT636* Design of an arduino shield for ota programming, F. Campà, J. Mora, A. Navarro

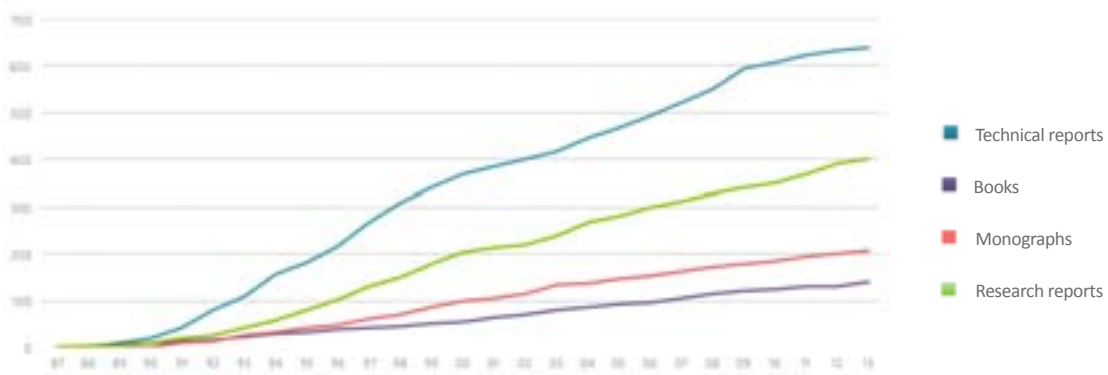
*IT637* Validation of the particle finite element method (PFEM) for simulation of rock slides in lakes and reservoirs, J. Irazabal, F. Salazar, E.Oñate

*IT638* Simulación del proceso de embutido de piezas rectangulares usando el software stampack, Y. Bernal-Aguilar, J.R. Marty-Delgado, E.L. Zamora-Hondares

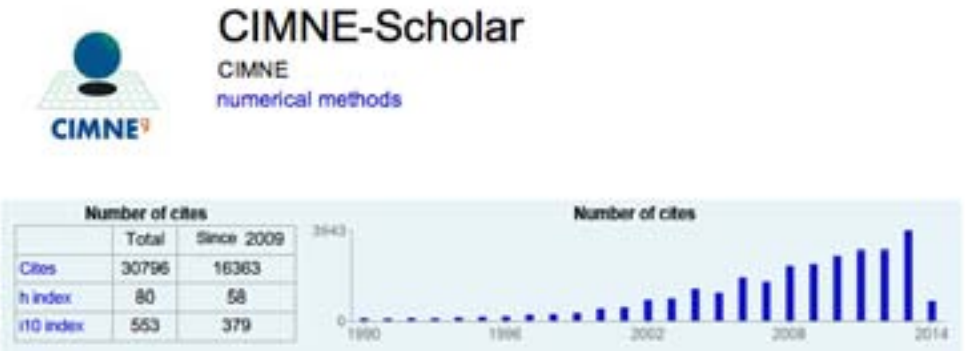
*IT639* A CAD tool for electromagnetic modeling of braided wire shields, R. Otin, R. Isanta

*IT640* International school on technologies for innovation products and services in engineering (TIPSEN)

Since 1987 CIMNE has edited 1387 scientific and technical publications.



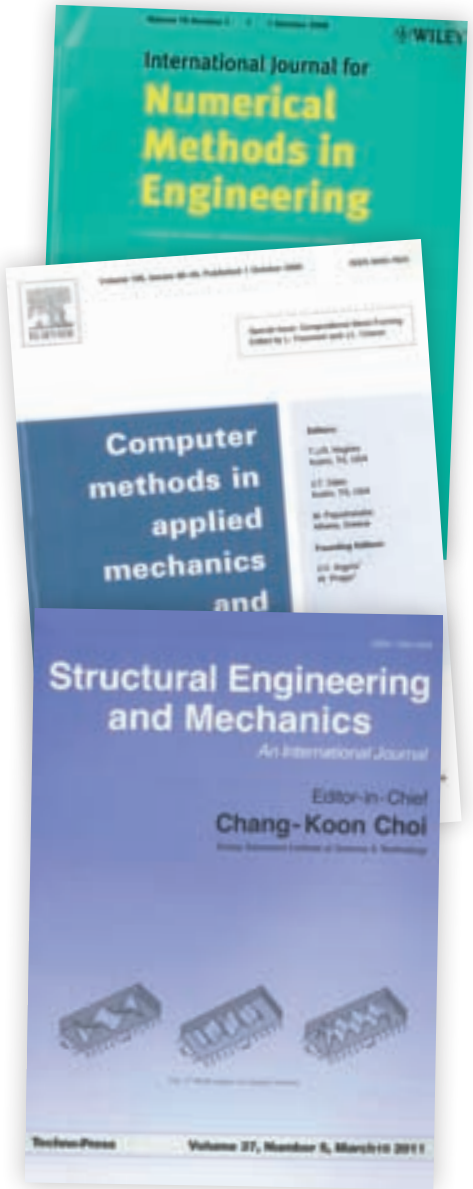

Number of cites of CIMNE scientists recorded by CIMNE Scholar




*http://scholar.google.es/citations?hl=es&user=7ZrIPS4AAAAJ&view_op=list_works&is_public_preview=1*

## Publications in scientific journals

This is the list of the **76 papers** in scientific journals published by CIMNE researchers in 2013.




Agelet de Saracibar C., López R., Ducoeur B., Chiumenti M. and de Meester B.
*A numerical model for the simulation of precipitates dissolution of hardened aluminium alloys using neural networks, Revista Internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería, Volume 29, Issue 1, January-March 2013, Pages 29-37, First published on-line: 22 February 2013 | doi: 10.1016/j.rimni, 2013*

Alfonzo M. and Cerrolaza M.
*Simulación y análisis computacional del conducto medular del fémur en presencia de una prótesis de cadera, Rev. Facultad Ingeniería UCV 28(4):25-36, 2013*

Alonso E., Pinyol N.M. and Pineda J.A.
*Foundation of a gravity dam on layered soft rock: shear strength of bedding planes in laboratory and large "in situ" tests. Geotechnical and geological engineering. pp. 1 - 12. 07/2013*

Alonso E.E., Pinyol N.M. and Gens A.
*Compacted soil behaviour: initial state, structure and constitutive modeling. Geotechnique, 63 (6), 463-478, 10.1680/geot.11.P.134, 2013*

Avila-Haro J. A., González-Drigo J. R., Vargas Y. F., Pujades L. G. and Barbat A. H.
*Deterministic and Probabilistic Earthquake Scenarios for the Seismic Risk Analysis of URM Buildings, Key Engineering Materials, 525-526, 2013, 537-540.*

Badia S., Codina R. and Planas R.
*On unconditionally convergent stabilized finite element approximation of resistive magnetohydrodynamics, Journal of Computational Physics, Vol. 234 (2013), 399-416*

Badia S., Martín A. F. and Príncipe J.
*Enhanced Balancing Neumann-Neumann preconditioning in computational fluid and solid mechanics, International Journal for Numerical Methods in Engineering, Vol. 96(4), pp. 203–230, 2013.*

Badia S., Martín A. F. and Príncipe J.
*Implementation and scalability analysis of balancing domain decomposition methods, Archives of Computational Methods in Engineering, Vol. 20(3), pp. 239-262, 2013*

Baiges J. and Codina R.
*A variational multiscale method with subscales on the element boundaries for the Helmholtz equation, International Journal for Numerical Methods in Engineering, Vol. 93 (2013), 664-684*

Baiges J., Codina R. and Idelsohn S.
*A domain decomposition strategy for reduced order models. Application to the incompressible Navier-Stokes equations, Computer Methods in Applied Mechanics and Engineering, Vol. 267 (2013), 23-42*

Baiges J., Codina R. and Idelsohn S.
*Explicit reduced order models for the stabilized finite element approximation of the incompressible Navier-Stokes equations, International Journal for Numerical Methods in Fluids, Vol. 72 (2013), 1219-1243*

Barbero E. J., Cosso F. A. and Martinez X.
*Identification of Fracture Toughness for Discrete Damage Mechanics Analysis of Glass-Epoxy Laminates. Applied Composite Materials. DOI: 10.1007/s10443-013-9359-y, 2013*

Barbero E., Martinez X. and Sosa E.M.
*Reliability design methodology for confined high pressure inflatable structures. Engineering Structures. 51: 1-9, 2013. ISSN 0141-0296.*

Birkmann J., Cardona O. D., Carreño M. L., Barbat A. H., Pelling M., Schneiderbauer S., Kienberger S., Keiler M., Zeil P. and Welle T.
*Framing vulnerability, risk and societal responses: the MOVE framework, Natural Hazards, 67(2), 193-211, 2013.*

Bugeda G.
*Reflexions sobre el funcionament del «Manual d'avaluació docent del professorat de la UPC», El Butlletí. Publicació bimestral d'AQU Catalunya, vol 65, Marzo 2013.*

Bussetta P., Dialami N., Chiumenti M., Agelet de Saracibar C., Cervera M. and Ponthot J.P.
*Comparison of a fluid and a solid approach for the numerical simulation of friction stir welding with a non-cylindrical pin, Steel Research International, First published on-line: 13 December 2013 | doi: 10.1002/srin.201300182, 2013.*

Carbonell J.Mª. and Oñate E.
*Modelling of tunnelling processes and rock cutting tool wear with the Particle Finite Element Method, Computational Mechanics, Vol. 52 (3), pp. 607-629, 2013*

Casoni E., Peraire J. and Huerta A.
*One-dimensional shock-capturing for high-order Discontinuous Galerkin methods, International Journal for Numerical Methods in Fluids, Vol. 71, Iss. 6, pp. 737-755, 2013*

Chacón R., Uribe N. and Oller S.
*Numerical Validation of the Incremental Launching Method of a Steel Bridge Through a Small-Scale Experimental Study. Experimental Techniques (SEM). Wiley Online Library. November 2013, doi:10.1111/ext.12069. Online ISSN: 1747-1567, 2013*

Chinesta F., Leygue A., Bordeu F., Vicente Aguado J., Cueto E., González D., Alfaro I., Ammar A. and Huerta A.
*PGD-Based Computational Vademecum for Efficient Design, Optimization and Control, Archives of Computational Methods in Engineering, Vol. 20, Issue 1, pp. 31-59, 2013*

Chiumenti M., Cervera M., Agelet de Saracibar C. and Dialami N.
*Numerical modeling of friction stir welding processes, Computer Methods in Applied Mechanics and Engineering, Volume 254, February 2013, pp. 353-369, First published on-line: 10 October 2012 | doi: 10.1016/j.cma.2012.09.013*

Codina R. and Badia S.
*On the design of discontinuous Galerkin methods for elliptic problems based on hybrid formulations, Computer Methods in Applied Mechanics and Engineering, Vol. 263 (2013), 158-168, 2013*

Dadvand P., Rossi, R., Gil M., Martorell X., Cotela J. Juanpere E., Idelsohn S. and Oñate E.
*Migration of a generic multi-physics framework to HPC environments, Computers and Fluids, Vol. 80 (SI), pp. 301-309, 2013*

Del Río J. and Cerrolaza M.
*Influencia de factores hidrodinámicos y estructurales en el comportamiento de las válvulas cardíacas, Rev. Facultad Ingeniería UCV 28(4):115-123*

Del Río J., Romero E. and Cerrolaza M.
*Estudio del flujo sanguíneo con un modelo cardiovascular de parámetros concentrados, Rev. Informe Médico 15(3):28-37 , 2013*

Dialami N., Chiumenti M., Cervera M. and Agelet de Saracibar C.
*An apropos kinematic framework for the numerical modeling of friction stir welding, Computers & Structures, Volume 117, February 2013, pp.48-57, 2013*

Dialami N., Chiumenti M., Cervera M., Agelet de Saracibar C. and Ponthot J.P.
*Material flow visualization in friction stir welding via particle tracing, International Journal of Material Forming, First published on-line: 20 December 2013 | doi: 10.1007/s12289-013-1157-4*

Duarte V. and Cerrolaza M.
*Modelado piezoeléctrico del hueso por el método de los elementos de contorno, Rev. Facultad Ingeniería UCV, 28(4):147-158*

Eijo A., Oñate E. and Oller S.
*A numerical model of delamination in composite laminated beams using the LRZ beam element based on the refined zigzag theory, Composite Structures, Vol. 104, pp. 270-280, 2013*

Eijo, A., Oñate E. and Oller S.
*A four-noded quadrilateral element for composite laminated plates/shells using the refined zigzag theory, Int. Journal for Numerical Methods in Engineering, Vol. 95 (8), pp. 631-660, 2013*

García-Berro E., Amblàs G., Sallarés J., Bugeda G. and Roca S.
*Docencia e investigación: ¿un falso dilema?, Aula Abierta, Vol. 41, Num. 2, pp. 13-22, 2013.*

Garitte B., Bond A., Millard A., Zhang C., Mcdermotte C., Nakamaf S. and Gens, A.
*Analysis of hydro-mechanical processes in a ventilated tunnel in an argillaceous rock on the basis of different modelling approaches. Journal of Rock Mechanics and Geotechnical Engineering 5, 1–17, 2013*

Garitte B., Gens A., Vaunat J. and Armand, G.
*Thermal Conductivity of Argillaceous Rocks: Determination Methodology Using In Situ Heating Tests. Rock Mech Rock Eng. 47(1), 111-129. DOI 10.1007/s00603-012-0335-x, 2013*

Gens A., Valleján B., Zandarín M-T. and Sánchez M.
*Homogenization in clay barriers and seals: Two case studies. Journal of Rock Mechanics and Geotechnical Engineering 5, 191-199 [http://dx.doi.org/10.1016/j.jrmge.2013.04.003], 2013*

Giorgiani G., Fernández-Méndez, S. and Huerta A.
*Hybridizable Discontinuous Galerkin p-adaptivity for wave propagation problems, International Journal for Numerical Methods in Fluids, Vol. 72, Num: 12, pp. 1244-1262, 2013*

Giorgiani G., Modesto D., Fernández-Méndez S. and Huerta, A.
*High-order continuous and discontinuous Galerkin methods for wave problems, International Journal for Numerical Methods in Fluids, Vol. 73, Issue 10, pp. 883-903, 2013*

Gonzalez D., Cueto E., Chinesta F., Díez P. and Huerta A.
*SUPG-based stabilization of Proper Generalized Decompositions for the high-dimensional Advection-Diffusion Equations, International Journal for Numerical Methods in Engineering, Vol. 94, Issue: 13, pp. 1216-1232, 2013*

Gonzalez Y., Nieto F. and Cerrolaza M.
*Modeling the nutrients behavior in intervertebral discs: a boundary integral simulation, J. of Molecular & Cell Biomech. 10(1):67-84, 2013*

Guasch O. and Codina R.
*Statistical behavior of the orthogonal subgrid scale stabilization terms in the finite element large eddy simulation of turbulent flows, Computer Methods in Applied Mechanics and Engineering, Vol. 261-262, 154-166, 2013*

Guimaraes L. N., Gens A., Sánchez M., Olivella S.
*A chemo-mechanical constitutive model accounting for cation exchange in expansive clays. Geotechnique 63, (3), 221–234 [http://dx.doi.org/10.1680/geot.SIP13.P.012], 2013*

Hachem E., Feghali S., Codina R. and Coupez T.
*Anisotropic adaptive meshing and monolithic variational multiscale method for fluid-structure interaction, Computers and Structures, Vol. 122, 88-100, 2013*

Hachem E., Feghali S., Codina R. and Coupez T.
*Immersed stress method for fluid structure interaction using anisotropic mesh adaption, International Journal for Numerical Methods in Engineering, Vol. 94, 805-825, 2013*

Herrera R. I. , Vielma J. C. , Ugel R. , Alfaro A. , Barbat A. H. and Pujades L.
*Seismic response and torsional effects of RC structure with irregular plant and variations in diaphragms, designed with Venezuelan codes, WIT Transactions on the Built Environment, 132, 85-96, 2013*

Huerta, A., Angeloski A., Roca X. and Peraire J.
*Efficiency of high-order elements for continuous and discontinuous Galerkin methods, International Journal for Numerical Methods in Engineering, Vol. 96, Num: 9, pp. 529-560, 2013*

Kamran K., Rossi R. and Oñate E.
*A compressible Lagrangian framework for modeling the fluid–structure interaction in the underwater implosion of an aluminum cylinder, Mathematical Models and Methods in Applied Sciences (M3AS), Vol. 23 (2), pp. 339-367, 2013*

Kamran K., Rossi R. and Oñate E.
*A contact algorithm for shell problems via Delaunay-based meshing of the contact domain, Computational Mechanics, Vol. 52 (1), pp. 1-16, 2013*

Kamran K., Rossi R., Oñate E. and Idelsohn S.
*A compressible Lagrangian framework for the simulation of the underwater implosion of large air bubbles, Computer Methods in Applied Mechanics and Engineering, Vol. 255 (1), pp. 210-225, 2013*

Kouhi M., Lee D. S., Bugeda G. and Oñate E.
*Multi-Objective Aerodynamic Shape Optimization using MOGA coupled to Advanced Adaptive Mesh Refinement, Computers and Fluids, vol. 88, pp. 298-312, 2013.*

Larese A., Rossi R., Oñate, E., Toledo M., Moran R. and Campos, H.
*Numerical and experimental study of overtopping and failure of rockfill dams, International Journal of Geomechanics (ASCE), 2013, 10.1061/(ASCE)GM.1943-5622.0000345*

Lee D. S. , Morillo C., Oller S., Bugeda G. and Oñate E.
*Robust design optimisation of advanced hybrid (fiber-metal) composite structures, Composite Structures, Vol. 99, pp. 181-192, 2013.*

Lee D.S., Bugeda G., Periaux J. and Oñate E.
*Robust active shock control bump design optimisation using hybrid parallel MOGA, Computers and Fluids, Vol. 80, pp. 214 - 224, 2013*

Marulanda M. C. , Carreño M. L., Cardona O. D., Ordaz M. G. and Barbat A. H.
*Probabilistic earthquake risk assessment using CAPRA. Application to the city of Barcelona, Spain, Natural Hazards, 84, 69:59, 2013*

Muñoz J. J., Lyamin A. and Huerta A.
*Stability of anchored sheet wall in cohesive-frictional soils by FE limit analysis, International Journal for Numerical and Analytical Methods in Geomechanics, Vol. 37, Number 9, pp. 1213-1230, 2013*

Oller S.A., Nallim L. and Oller S.
*An integrated procedure for the structural design of a composite rotor-hydrofoil of a water current turbine (WCT). Applied Composite Materials. Vol. 20, Issue 6 (2013), Page 1273-1288. Print ISSN: 0929-189X. Online ISSN: 1573-4897, DOI: 10.1007/s10443-013-9332-9*

Oñate E., Marti J., Ryzhakov P., Rossi R. and Idelsohn S.
*Analysis of the melting, burning and flame spread of polymers with the particle finite element method, Computer Assisted Methods in Engineering and Science, Vol. 20 (3), pp. 165–184, 2013*

Oñate E., Nadukandi P. and Idelsohn S.
*P1/P0+ elements for incompressible flows with discontinuous material properties, Computer Methods in Applied Mechanics and Engineering, DOI: 10.1016/j.cma.2013.12.009, 2013*

Otin R.
*A numerical model for the search of the optimum frequency in electromagnetic metal forming, International Journal of Solids and Structures, Vol. 50 (10), pp. 1605-1612, 2013.*

Otin R.
*ERMES: A nodal-based finite element code for electromagnetic simulations in frequency domain, Computer Physics Communications, Vol. 184 (11), pp. 2588-2595, 2013.*

Otin R., García-Castillo L. E., Martínez-Fernández I. and García-Doñoro D.
*Computational performance of a weighted regularized Maxwell equation finite element formulation, Progress In Electromagnetics Research, Vol. 136, pp. 61-77, 2013.*

Parés N., Díez P. and Huerta A.
*Computable exact bounds for linear outputs from stabilized solutions of the advection-diffusion-reaction equation, International Journal for Numerical Methods in Engineering, Vol. 96, Num. 5, pp. 483-509, 2013*

Pérez M.A., Martínez X., Oller S., Gil L., Rastellini F. and Flores F.
*Impact damage prediction in carbon fiber-reinforced laminated composite using the matrix-reinforced mixing theory. Composite Structures. Volume 104, pp. 239 - 248, 2013*

Pérez-Foguet A., Casoni E. and Huerta A.
*Dimensionless analysis of HSDM and application to simulation of breakthrough curves of highly adsorbent porous media, ASCE Journal of Environmental Engineering, Vol. 139, Number 5, pp. 667-676, 2013*

Rango R. F. , Nallim L. G. and Oller S.
*Static and dynamic analysis of thick laminated plates using enriched macroelements. Composite Structures, Volume 101, 2013, Pages 94–103. ISSN: 0263-8223*

Rossi, R., Larese de Tetto A., Dadvand P. and Oñate E.
*An efficient edge-based level set finite element method for free surface flow problems, International Journal for Numerical Methods in Fluids, Vol. 71 (6), pp. 687-716, 2013*

Rupcich M., Cerrolaza M. and Bravo R.
*Biomechanical analysis of the human hip in children with hip arthrodesis, J. of Biomed Eng Res. 2(2):59-65, 2013*

Ryzhakov P., Cotela J., Rossi R. and Oñate E.
*A two-step monolithic method for efficient simulation of incompressible flows, Int. Jour, for Num. Methds. in Fluids, authors, Int. Journ. Num. Meth. in Fluids, doi: 10.1002/fld.3881, 2013*

Ryzhakov P., Rossi, R., Viña A. and Oñate E.
*Modelling and simulation of the sea-landing of aerial vehicles using the Particle Finite Element Method, Ocean Engineering, Vol. 66, pp. 92-100, 2013*

Salazar F., Morán R., Rossi R. and Oñate E.
*Analysis of the discharge capacity of radial-gated spillways using CFD and ANN - Oliana Dam case study, Journal of Hydraulic Research, Vol. 51 (3), pp. 244-252, 2013*

Serván-Camas B. and García-Espinosa J.
*Accelerated 3D multi-body seakeeping simulations using unstructured finite elements. Journal of Computational Physics 252, 382–403, 2013*

Soudah E., Rudenick P., Bordone M., Bijnens B., Garcia-Dorado D., Evangelista A. and Oñate E.
*Validation of numerical flow simulations against in vitro phantom measurements in different type B aortic dissection scenarios, Computer Methods in Biomechanics and Biomedical Engineering, Published online, 2013*

Ugel R. , Herrera R. I. , Vielma J. C., Barbat A. H. and Pujades L.
*Seismic and structural response of a framed four level building with RC and steel structure designed according to current Venezuelan codes, WIT Transactions on the Built Environment, 132, 109-120, 2013*

Vargas Y. F. , Pujades L. G. y Barbat A. H.
*Evaluación probabilista de la capacidad, fragilidad y daño sísmico en edificios de hormigón armado, Revista Internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería, 29(2), 63-78, 2013*

Vargas Y. F., Pujades L. G., Barbat A. H. and Hurtado J. E.
*Capacity, fragility and damage in reinforced concrete buildings: a probabilistic approach, Bulletin of Earthquake Engineering, 11(6), 2007-2032, 2013*


ARTIC
Catalan Institute for Applied Research
Technology Innovation and Creativity
TECNIO
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# ARTIC

# ARTIC

Catalan Institute for Applied Research
Technology Innovation and Creativity

The Catalan Institute of Applied Research, Technology Innovation and Creativity (ARTIC) is an association of independent institutions that generates, captures, and transfers scientific and technological knowledge. The goal of ARTIC is to improve the competitiveness of companies, institutions and administrations and enhance the quality of life of citizens through research and innovation.

ARTIC links the expertise of CIMNE, Barcelona Media and the Fundació CTM Centre for Technology (two technology centers of the TECNIO network). Each of these organizations offers a distinct skill to the alliance, enabling ARTIC to make new contributions to the fields of Content Creation, Social Media Analysis, Security, Culture and Tourism, Energy, Environmental Technology, Numerical Simulation, Civil Engineering, Aeronautics, and Socioeconomics, among others.

ARTIC was created in 2013.

### MEMBERS

Barcelona Media

CIMNE

ctm CENTRE TECNOLÒGIC

## ARTIC events

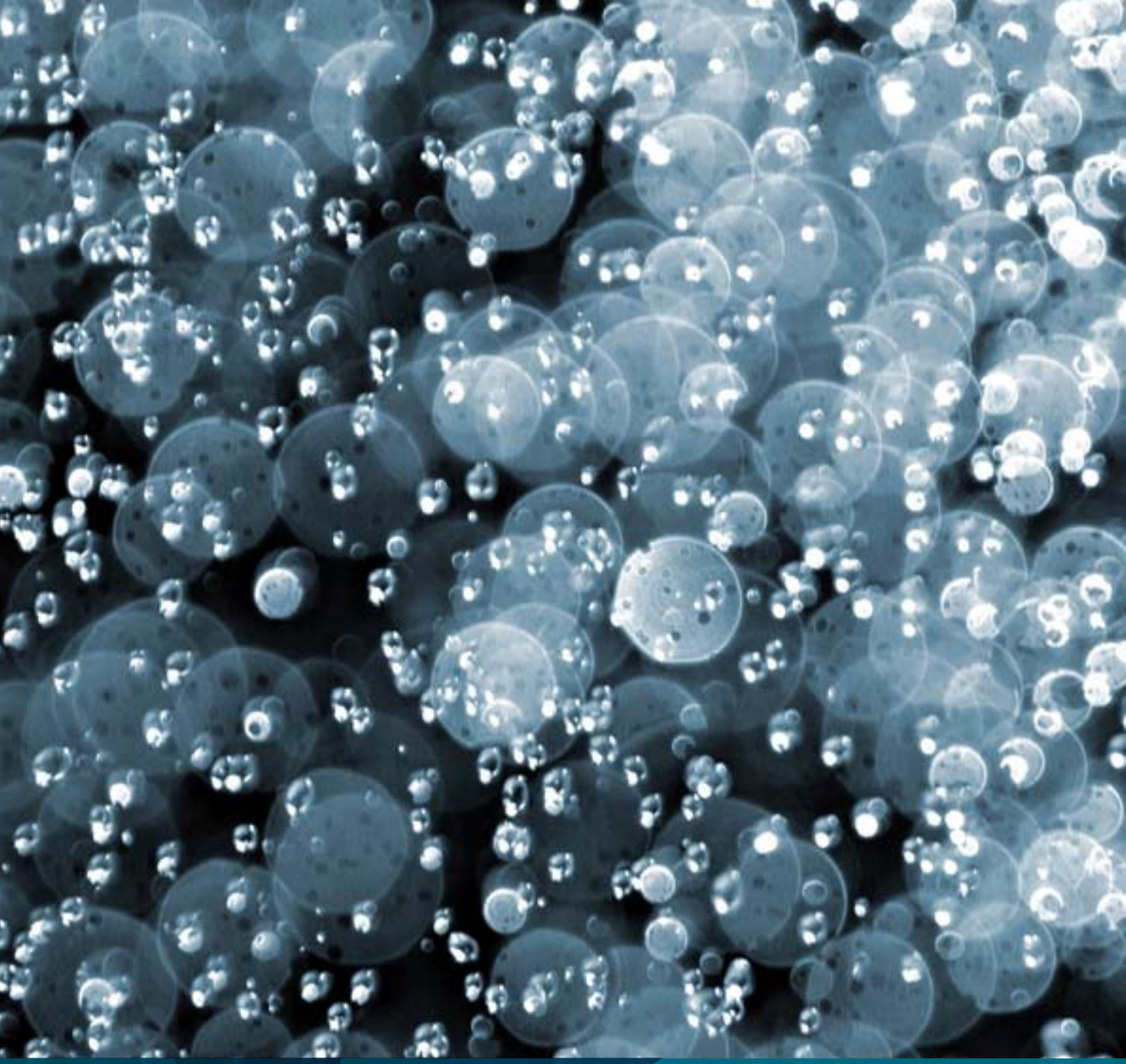
### Smart City Expo World Congress 2013

*19-21 November 2013, Barcelona, Spain*

### Mobile World Congress 2014

*24-27 February 2014, Barcelona, Spain*

*For more information visit: http://www.articalliance.com/*



FLUMEN INSTITUTE

# FLUMEN Institute

In 2011, CIMNE in partnership with the Technical University of Catalonia (UPC) created the new *FLUMEN Institute for River Dynamics and Hydrologic Engineering*.

FLUMEN Institute is the outcome of the merging of the prestigious Flumen RTD group existing since 2005 at the School of Civil Engineering of UPC and CIMNE. This partnership brings together the numerical and experimental expertise of the Flumen RTD group in hydraulics with the broad experience of CIMNE on numerical methods, computer simulation and integration of decision-support systems.

The FLUMEN Institute is located at the Noth Campus of UPC. Its objectives are the promotion of RTD and technology transfer activities in the field of river dynamics and hydrologic engineering.

The FLUMEN Institute is equipped with modern experimental facilities for model scale testing of river dynamic and hydraulic problems, as well as with advanced computer simulation codes.

The Flumen Institute is directed by Prof. Josep Dolz from UPC.

http://www.flumen.upc.edu/


Experimental facilities of FLUMEN Institute

## SCIENTIFIC SOCIETIES

SEMNI

R.C.O.F.I.A.

iacm

ECCOMAS

# Sociedad Española de Métodos Numéricos en Ingeniería (SEMNI)

## www.semni.org

In 1989, CIMNE contributed to the creation of the Spanish Society for Numerical Methods in Engineering (SEMNI). The basic aims of SEMNI are the organization and coordination of all activities related to numerical methods in engineering in Spain and being the Spanish representative in the International Association for Computational Mechanics (IACM).

SEMNI is linked to similar associations in other countries, such as the European Community on Computational Methods in Applied Sciences (ECCOMAS), the International Association for Computational Mechanics (IACM), the Groupe pour l'Avancement des Méthodes Numériques de l'Ingénieur in France, the United States Association for Computational Mechanics in the United States, and the Asociación Argentina de Mécanica Computacional among others. The headquarters of SEMNI are based in CIMNE.

Currently, SEMNI has over 400 members in Spain and in other countries. Some of the main activities of SEMNI include the organization of technical workshops and the Spanish Conference on Numerical Methods in Engineering.

SEMNI congresses take place in several cities; the first one was in the Canary Islands (1990). The subsequent SEMNI conferences took place in A Coruña (1993), Zaragoza (1996), Sevilla (1999), Madrid (2002), Lisbon (2004), Granada (2005), Porto (2007), Barcelona (2009), Coimbra (2011) and Bilbao (2013). The 12th SEMNI congress will be oganized in Lisbon on 6-9 July 2015.

SEMNI organized the 4th World Congress on Computational Mechanics in Buenos Aires in 1998 and the ECCOMAS congress in Barcelona in September, 2000. CIMNE will host the 2014 World Congress on Computational Mechanics in Barcelona.

SEMNI also organizes workshops and courses on numerical methods in engineering.

Since 1989 the SEMNI secretariat is located at CIMNE.

### The Executive Council of SEMNI is as follows:

**PRESIDENT**

Xavier Oliver (Univ. Politècnica de Catalunya)

**VICE-PRESIDENT**

José Mª Goicolea (Univ. Politécnica de Madrid)

**SECRETARY**

Irene Arias (Univ. Politècnica de Catalunya)

**PAST PRESIDENTS**

Eugenio Oñate (Univ. Politècnica de Catalunya)
Manuel Casteleiro (Univ. de A Coruña)

**EXECUTIVE COUNCIL MEMBERS**

Pilar Ariza (Univ. de Sevilla)
Jesús María Blanco (Univ. del Pais Vasco)
Miguel Cervera (Univ. Politècnica de Catalunya)
Ignasi Colominas (Univ. de A Coruña)
Elías Cueto (Univ. de Zaragoza)
Antonio Huerta (Univ. Politècnica de Catalunya)
Fermín Navarrina (Univ. de A Coruña)
Antonio Rodríguez (Univ. Politècnica de Catalunya)
Riccardo Rossi (CIMNE)

# European Research Community On Flow, Turbulence And Combustion (ERCOFTAC)

## www.ercoftac.org

The ERCOFTAC network was founded in 1987. It is composed of more than 60 research centers and companies, promoted by several European aerospace companies with the objective of gathering all European research centers working primarily in the numerical simulation of fluid mechanics problems in engineering. Since 1989, CIMNE is a Pilot Center of ERCOFTAC in Spain.

ERCOFTAC activities in Spain organized by the Pilot Center include the 8th European Turbulence Workshop (Barcelona 2000), the Europe-Russia Workshop (Barcelona 2006), the 3rd Workshop on Research in Turbulence (Seville 2008) and the 5th Workshop on Research in Turbulence (Tarragona 2010). The ERCOFTAC Pilot Center managed by cimne has organized next ERCOFTAC Spring Festival that will be held in Terrassa, Barcelona, next 15-16 May, 2014.

CIMNE has coordinated the E-caero project of the EC (2010-2013) aiming to promote joint activities of different scientific associations in the aeronautic field in Europe. ERCOFTAC is a partner in this project.

# International Association For Computational Mechanics (IACM)

## www.iacm.info

The International Association for Computational Mechanics (IACM) was founded in 1981. Its goal is to promote advances in computational mechanics.

For the purposes of the IACM, computational mechanics is defined as the development and application of numerical methods and digital computers to solve problems in engineering and applied sciences with the objectives of understanding and harnessing the resources of nature.

Computational Solid Mechanics (CSM) and Computational Fluid Dynamics (CFD) are at the core of IACM activity. Subjects such as thermodynamics, electromagnetics, rigid body mechanics, control systems and some aspects of particle physics fall naturally within the scope of the IACM. Indeed providing a common forum for discussion, education and research information transfer between the diverse disciplines represented is the main "raison d'être" of IACM.

Since 1994 the IACM Secretariat is located at CIMNE.

IACM organises the World Congress on Computational Mechanics (WCCM) every four years. Former editions of this congress were held in Austin (1988), Stuttgart (1990), Tokyo (1994), Buenos Aires (1998), Vienna (2002), Beijing (2004), California (2006), Venecia (2008), Sidney (2010) and Sao Paulo (2012). The WCCM 11 will take place in Barcelona on July 20-25, 2014.

IACM publishes a biannual bulletin and supports the organization of special interest conferences, IACM Simposia and courses in various fields of computational mechanics.

The Executive Council of IACM is composed by

### PRESIDENT:

G. Yagawa, Japan

### PAST PRESIDENTS:

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T.J.R. Hughes, U.S.A.
T. J. Oden, U.S.A.
A. Samuelson†, Sweden
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World Congress of the IACM. Barcelona July 20-25, 2014

# European Community on Computational Methods in Applied Sciences (ECCOMAS)

www.eccomas.org

ECCOMAS is a scientific organization founded in 1992, grouping together European associations with interests in the development and application of computational methods in applied sciences and technology. The mission of ECCOMAS is to promote joint efforts of European universities, research institutes and industries which are active in the broad field of numerical methods and computer simulation in Engineering and Applied Sciences (i.e. Computational Solid and Structural Mechanics, Fluid Dynamics, Acoustics, Electromagnetics, Physics, Chemistry, Applied Mathematics, and Scientific Computing), to address critical societal and technological issues with particular emphasis on multidisciplinary applications and disseminate innovative research in the fields of interest of ECCOMAS.

The main event organized by ECCOMAS is a large European Congress taking place on a four year cycle and addressing scientists and engineers both in and outside Europe. The main objective of these conferences is to provide a forum for presentation and discussion of state-of-the-art in scientific computing applied to engineering sciences. Equal emphasis is given to basic methodologies, scientific development and industrial applications. The ECCOMAS Congress includes invited lectures, invited Special Technological Sessions (STS), contributed papers from Academy and Industry and organized Minisymposia. Proceedings of the ECCOMAS Congresses are widely disseminated in Europe.

The previous ECCOMAS Congresses were held in Paris, France (1996), Barcelona, Spain (2000), Jyvaskyla, Finland (2004), Venezia, Italy (2008) in conjunction with the World Conference on Computational Mechanics of the IACM, and Vienna, Austria (2012). The next ECCOMAS congress will take place in Crete (Greece) on 2016.

The ECCOMAS Congress, together with the ECCOMAS Conference on Computational Solid and Structural Mechanics (ECCM) and the ECCOMAS Conference on Computational Fluid Dynamics (ECFD), constitute the three main scientific events of ECCOMAS organized every four years, on even years, which attract approximately 5000 participants in total.

The previous ECCM conferences were held in Munich, Germany (1999), Cracow, Poland (2001), Lisbon, Portugal (2006), Paris, France (2010). The previous ECFD conferemces were held in Stuttgart, Germany (1994), Swansea, UK (2001), Egmond aan Zee, The Netherlands (2006), Lisbon, Portugal (2010).

The next ECCM and ECFD Conferences will be jointly organized in Barcelona on July 20-25, 2014.

These series of ECCOMAS global meetings are complemented with more focused thematic conferences on state-of-the-art topics in computational sciences and engineering organised with the support of ECCOMAS.

The secretariat of ECCOMAS is based in CIMNE since 1996.

## ECCOMAS MANAGING BOARD

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E. Ramm

### VICE PRESIDENTS

P. Díez — F. Auricchio

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Japan Society of Me
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# AWARDS

# Awards to CIMNE Scientists (2008-2013)

## Eduardo Alonso

*GEOTECHNICAL RESEARCH MEDAL.* Institution of Civil Engineers (United Kingdom), 2009

*GEOTECHNICAL RESEARCH MEDAL.* Inst. of Civil Engineers (United Kingdom), 2010

*The Third Kezdi Lecture*. From Hungarian Society of Soil Mechanics an Foundation Engineering. Budapest, 2013

*The 30th Rocha Lecture.* From, Sociedade Portuguesa de Geotecnia. Lisboa, 2013

*The Third ISRM online Lecture.* From International Society of Rock Mechanics, 2013

## Santiago Badia

*PREMI EXTRAORDINARI DE DOCTORAT ENGINYERIA CIVIL,* Universitat Politècnica de Catalunya, 2008

*STARTING GRANT* of the European Research Council (ERC), 2010

*SEMA Award* to young researchers by the Spanish Society of Applied Mathematics, 2012

## Antonio Gens

*Outstanding Contributions Award* from International Association for Computer Methods and Advances in Geomechanics (IACMAG), 2011

*Miembro de la Royal Academy of Engineering of UK.* 2011

*Vicepresident for Europe* of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), 2013

## Antonio Huerta

*PRANDTL MEDAL* of the European Community on Computational Methods in Applied Science, 2008

## Sergio Idelsohn

*EMERALD AWARD FOR EXCELLENCE PAPER* published in Engineering Computations, 2009

*SEMNI 2009 AWARD* in recognition to a professional and international career in the Numerical Methods in Engineering, 2009

*ADVANCED GRANT,* of the European Research Council, 2009

*PERSONALITY OF THE YEAR.* Newspaper El Litoral, Santa Fe, Argentina, 2010

*PRANDTL MEDAL* of the European Community on Computational Fluid Dynamics, 2012

## Xavier Oliver

*IACM COMPUTATIONAL MECHANICS AWARD,* Venezia, 2008

*PREMIO AMCA INTERNACIONAL A LA TRAYECTORIA CIENTÍFICA,* San Luis, Argentina, 2008

*ADVANCED GRANT,* of the European Research Council, 2012

## Eugenio Oñate

*O.C. ZIENKIEWICZ MEDAL* of the Polish Association for Computational Mechanics (PACM), 2009

*TED BELYTSCHKO APPLIED MECHANICS AWARD (ASME),* 2009

*COMPUTATIONAL MECHANICS AWARD* from Japan Society of Mechanical Engineers (Jsme), 2009

*LITERATI AWARD FOR EXCELLENCE* to the best paper published in Engineering Computations, 2009

*GAUSS-NEWTON MEDAL* from International Association For Computational Mechanics (Iacm), 2010.

*ADVANCED GRANT,* of the European Research Council, 2010

*HONORARY DOCTORATE DEGREE* by the Institut National des Sciences Appliquées (INSA), Lyon, 2012

*DOCTOR HONORIS CAUSA* by the University "Martha Abreu" of Las Villas, Santa Clara (Cuba), 2013

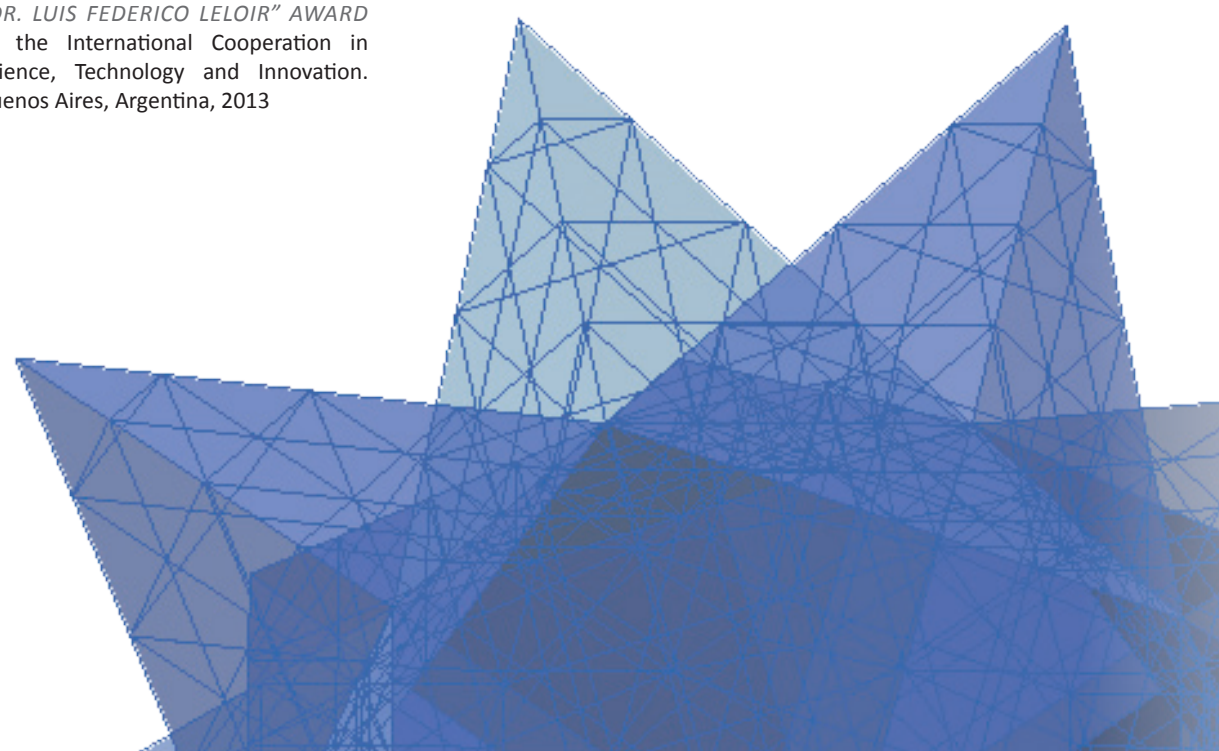
*"DR. LUIS FEDERICO LELOIR" AWARD* to the International Cooperation in Science, Technology and Innovation. Buenos Aires, Argentina, 2013

## Sergio Oller

*DOCTOR HONORIS CAUSA* awarded by the Universidad Nacional de Salta, Argentina, 2007

## Benjamín Suárez

Medal to the Professional Merit from the Colegio de Ingenieros de Caminos, Canales y Puertos, 2010



# Awards to CIMNE

*AINE 2010 Award*

CIMNE was distinguished with the 2010 AINE Award, as the most innovative organization related to the naval sector the Award in promoted by the Asociación de Ingenieros Navales de España (AINE).

*Award Duran i Farrell for Research and Technology Univesitat Politècnica de Catalunya, 2004*

The Award was delivered to CIMNE scientists Dr. Oñate and Dr. García for their work entitled: "Development of a new finite element code for the hydrodynamic study of vessels. Aplications to the design of sailing ships for the America Cup race".

*Ciutat de Barcelona 2002 Award in Technological Research*

On February 11 2003, the Ciutat de Barcelona award in Technological Research was awarded to the CIMNE research team formed by Eugenio Oñate, Ramon Ribó, Enrique Escolano, Miquel Pasenau and Jorge Suit Pérez, for the development of the GID system, an innovative and user-friendly graphic interface that allows the geometric modeling and visualization of the results of numerical simulations.

*Narcís de Monturiol Plate Award to the Scientific and Technological Merit 1999*

On November 3, 1999 the Generalitat de Catalunya granted to CIMNE the Narcís de Monturiol Plate Award for Scientific and Technological Merit:

- For its contribution to the development of new methods for analysis and design for products and processes in engineering.
- For the fostering of cooperation between industry and university research groups.
- For many training activities and the promotion of science and technology at the international level.

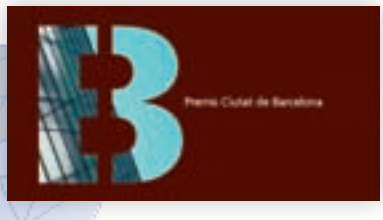
*Special mention to the Ciutat de Barcelona Award 1999*

The city of Barcelona awarded CIMNE a Special Mention to the Ciutat de Barcelona Award, 1999, in the category of Technological Research for the work carried out by Drs. P. Roca, M. Cervera, and E. Oñate on the modeling and structural analysis of the Barcelona Cathedral.

*IST Award to the best product of the Information Society Technologies Programme of European Commission (EC).*

The EC granted in November 2001 the IST Award to the pre/post processor system GiD developed at CIMNE.

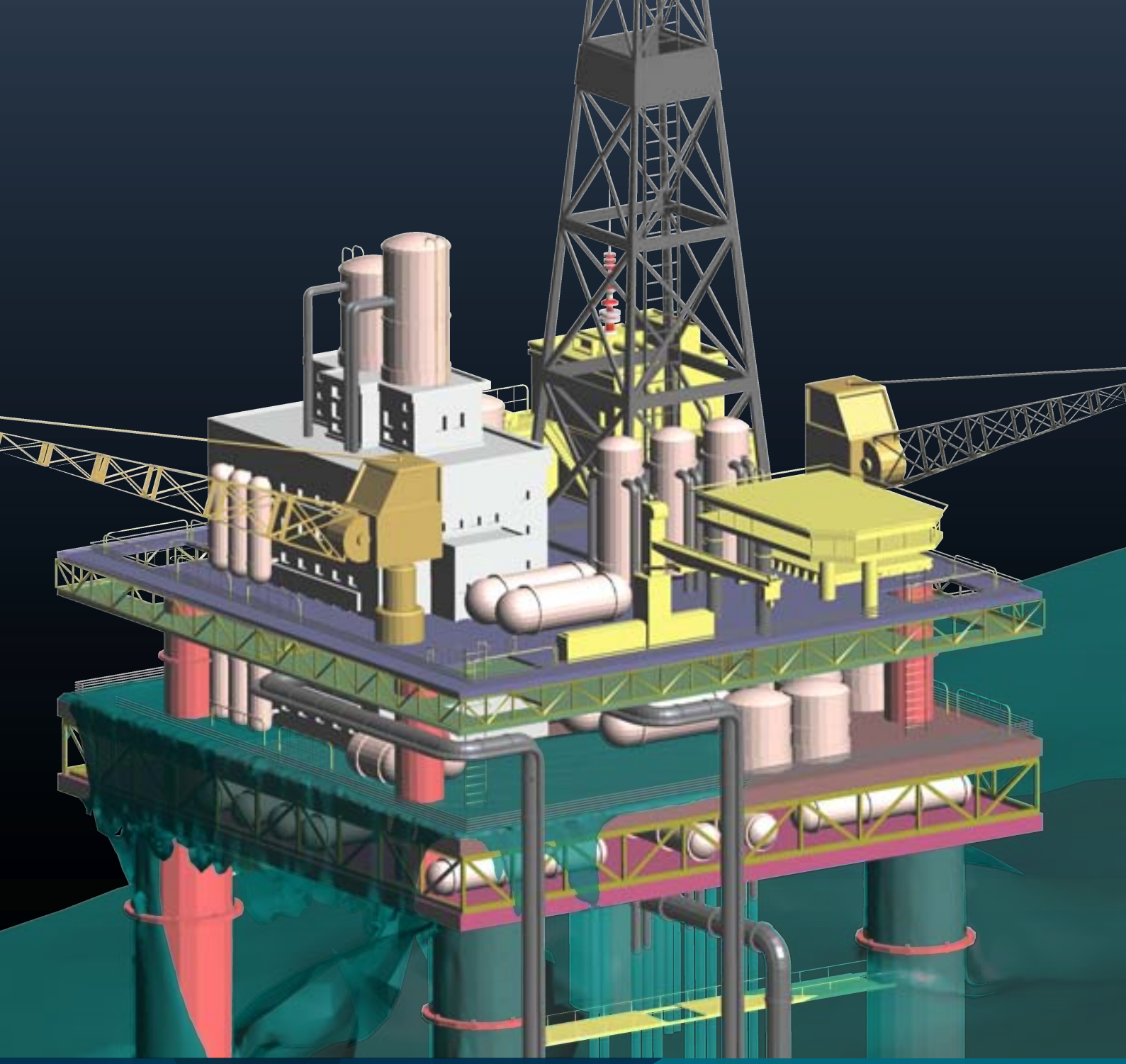
AINE 2010 Award




Premi Ciutat de Barcelona, 2002

Narcís de Monturiol Plate

IST Award



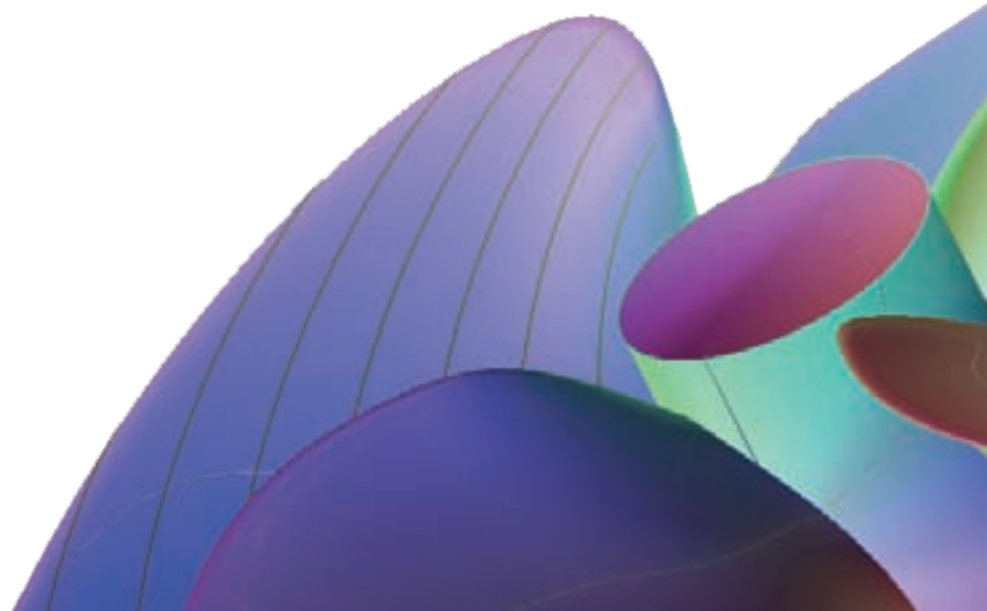
# RESEARCH AND DEVELOPMENT ACTIVITIES

# Research areas

CIMNE's Research and Development activities are split into the following areas:

- Numerical Methods
- Solid and Structural Mechanics
- Computational Fluid Dynamics
- Stochastic Mechanics
- Materials
- Optimization Methods
- Electromagnetics
- Geomechanics
- Pre and post processing
- Information and Communication Technology
- Artificial Intelligence

In the following pages the main activities of each research area are described.



## Numerical Methods

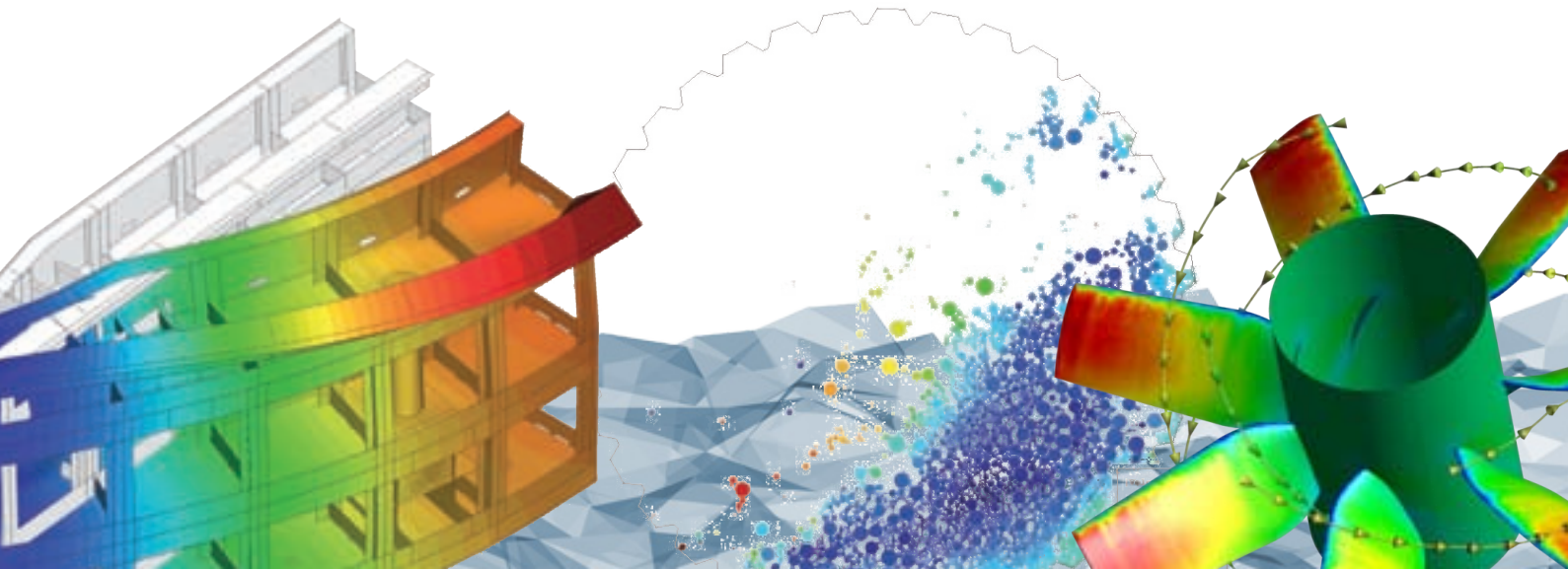
- Advanced numerical methods for solving partial differential equations.
- New meshless methods in computational mechanics
- Innovative solution algorithms for large algebraic systems
- Error estimation and mesh refinement techniques in solid and fluid mechanics
- Methods for certificating the quality of the numerical solution in computational mechanics

## Solid and Structural Mechanics

- Finite element methods for linear and non linear analysis of solids and structures.
- Meshless methods in solid mechanics
- Strong discontinuity analysis in solids. Applications to fracture mechanics.
- Rotation-free plate and shell elements
- Coupled problems in solid mechanics (fluid-structure interaction, thermal-mechanical problems, electromagnetics, etc.)
- Combination of finite element and particle methods in solid mechanics.

## Computational Fluid Dynamics

- Stabilized finite element and finite volume methods in compressible and incompressible fluid mechanics
- Meshless methods in fluid mechanics
- Finite element and particle methods for free surface flows.
- Numerical methods for multidisciplinary problems in fluid mechanics (fluid-structure interaction, thermal flows, electromagnetics, etc.)



## Stochastic Mechanics

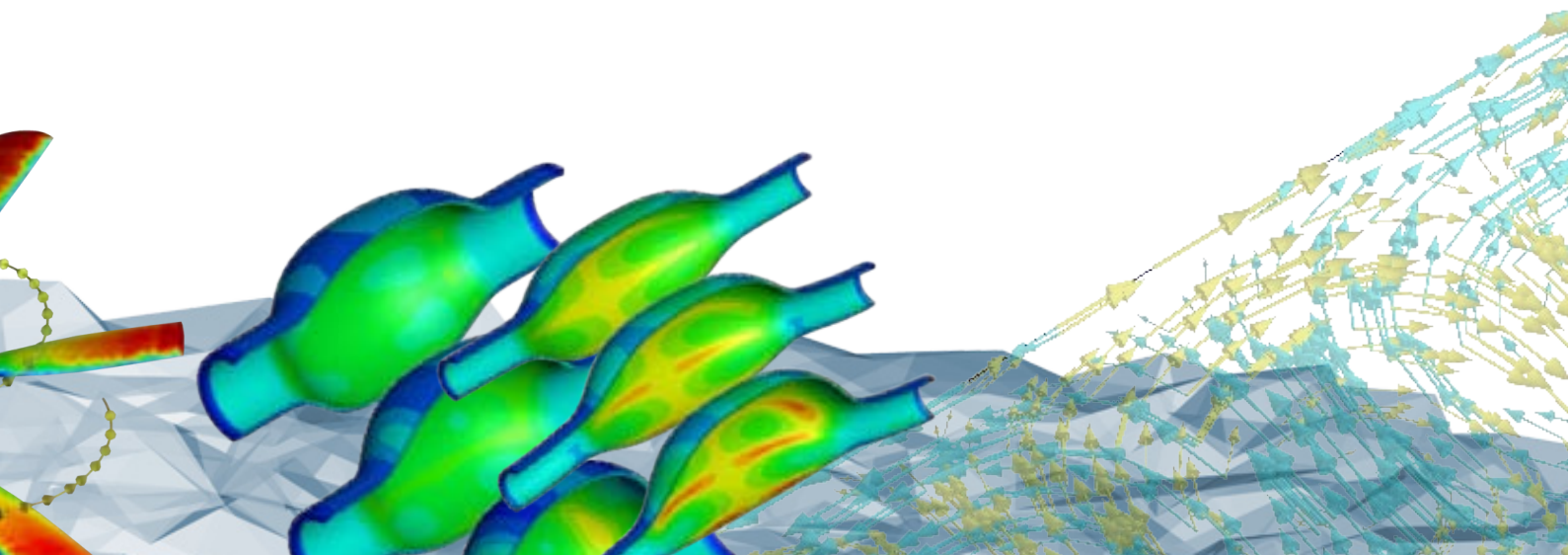
- Monte-Carlo methods for stochastic analysis in computational mechanics
- Game theory for multidisciplinary optimization problems
- Stochastic finite element methods
- Coupling of stochastic methods and finite element methods in solid and fluid mechanics
- Parameter identification via stochastic methods
- Stochastic methods for computer simulation of industrial forming processes.

## Materials

- New constitutive models for frictional materials (concrete, rocks, soil) and metallic materials.
- Constitutive models for composite materials
- Nano-material models
- Constitutive models for bio-materials
- Parameter identifications in constitutive models of materials
- Material models for discrete element methods.

## Optimization Methods

- Development of optimization algorithms based in gradient techniques
- Development of optimization methods based in evolutionary algorithms
- New methods for robust optimal design using game theory
- Parameter identification in constitutive models via optimization technics
- Identification of the optimal mesh size in optimal design processes



## Electromagnetics

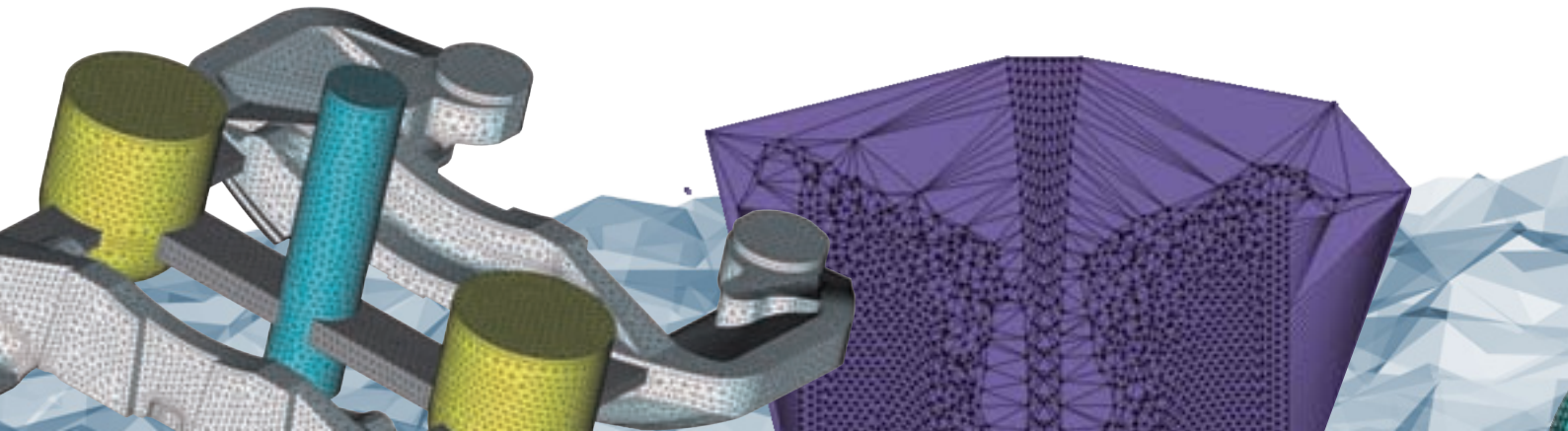
- Development of electromagnetic solutions using computing tools: ranging from numerical methods for the simulation of the Maxwell's equations in three-dimensional spaces, to codes for processing and analysing electromagnetic phenomena.
- Study of the behaviour of new devices and materials such as: new generations of electrical machines or superconductor-based machines.
- Electromagnetic solutions for food control and processing.
- Sheet stamping processes via electromagnetic fields.
- Numerical methods for plasma phycics and fusion technology.

## Geomechanics

- Constitutive models to study the constitutive behaviour of soils and rocks by finite element methods.
- Finite element methods for coupled problems in geotechnical engineering.
- Finite element and particle methods for modelling and analysis of bed erosion in free surface flows.
- Discrete element methods for geomechanical problems.
- Particle finite element methods for geomechanical problems.
- Numerical methods for underground construction problems.
- Study of tool wear in construction machines.

## Pre and post processing

- Development and maintenance of the GiD pre and post processing system (www.gidhome.com).
- New methods for generating structured and unstructured meshes.
- Input data technology for large scale computational problems.
- Graphical visualization techniques for large scale simulation problems.
- Generation of input data for finite element analysis from medical images.
- Integration of geographical information systems (GIS) with pre and post processing tools and finite element analysis codes.
- Meshless methods for the parametrization of geometries for shape optimization problems.

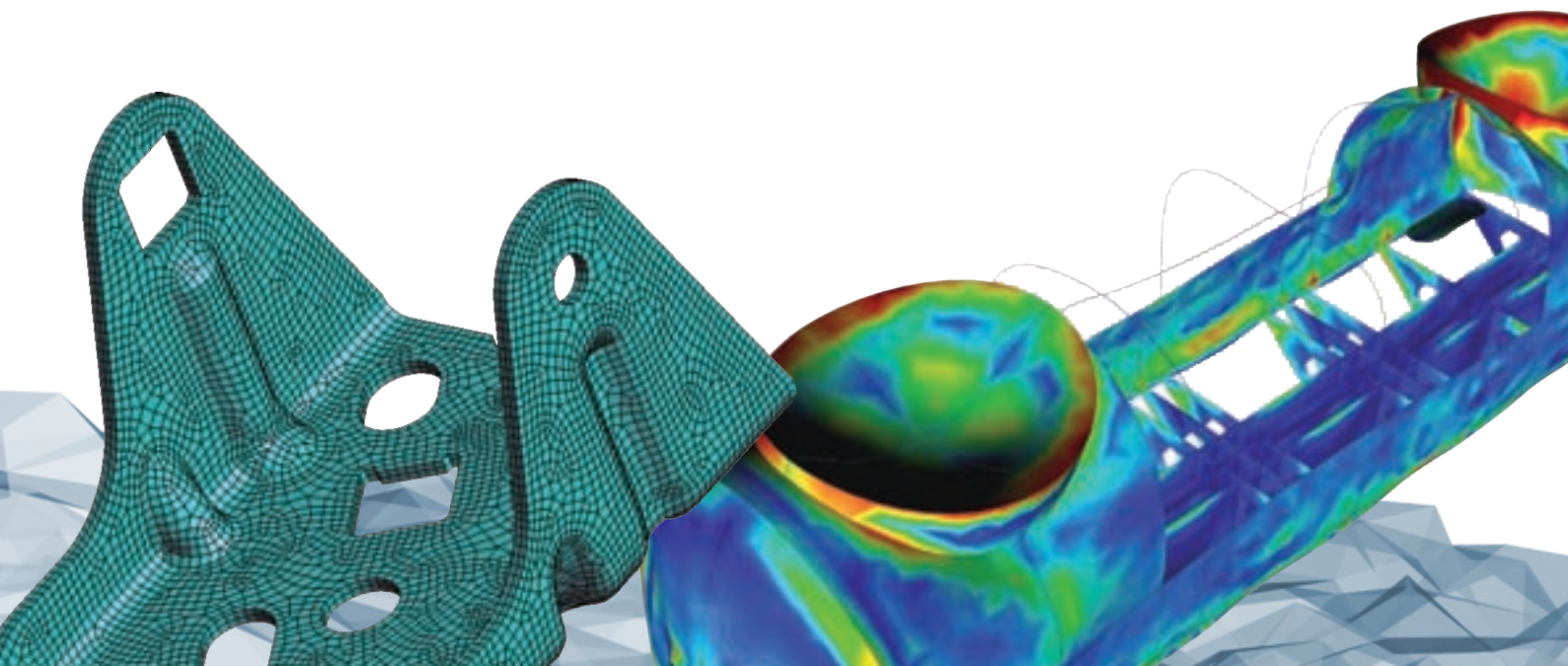


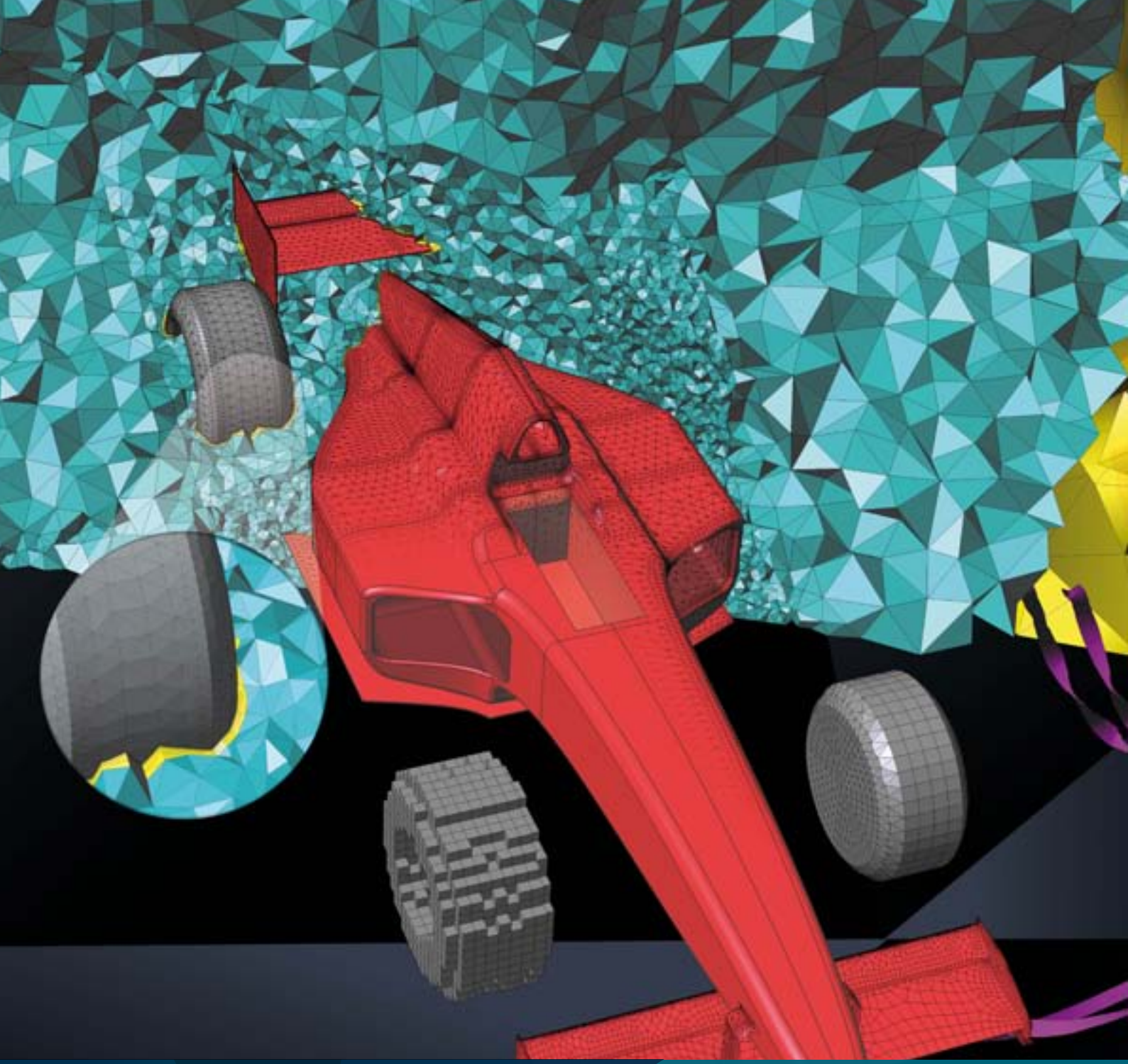
## Information and Communication Technology

- Internet tools for supporting management and training activities of individuals and organizations
- Methods for integrating and managing wireless sensors in Internet platforms.
- Health monitoring methods for constructions and buildings using wireless sensors and ICT.
- Development and integration of geographic information tools into decision support systems.
- Decision support systems integrating wireless sensors, networks, data bases, info-mechanics systems, computer simulation methods and AI technology.
- Application of ICT to manufacturing processes in industry.

## Artificial Intelligence

- Development of artificial neural networks (ANN) for optimization, inverse analysis and fast decision making.
- Integration of artificial neural networks (ANN) in decision support systems combining wireless sensors, computer simulationsmethods and artificial intelligence technology.
- Development of artificial intelligence techniques based in agent simulations.
- Applications of ANN technology for parameter identification in constitutive laws
- Development of intelligent finite element methods via AI technology.





# RESEARCH, DEVELOPMENT AND INNOVATION DEPARTMENTS

# RDI Departments

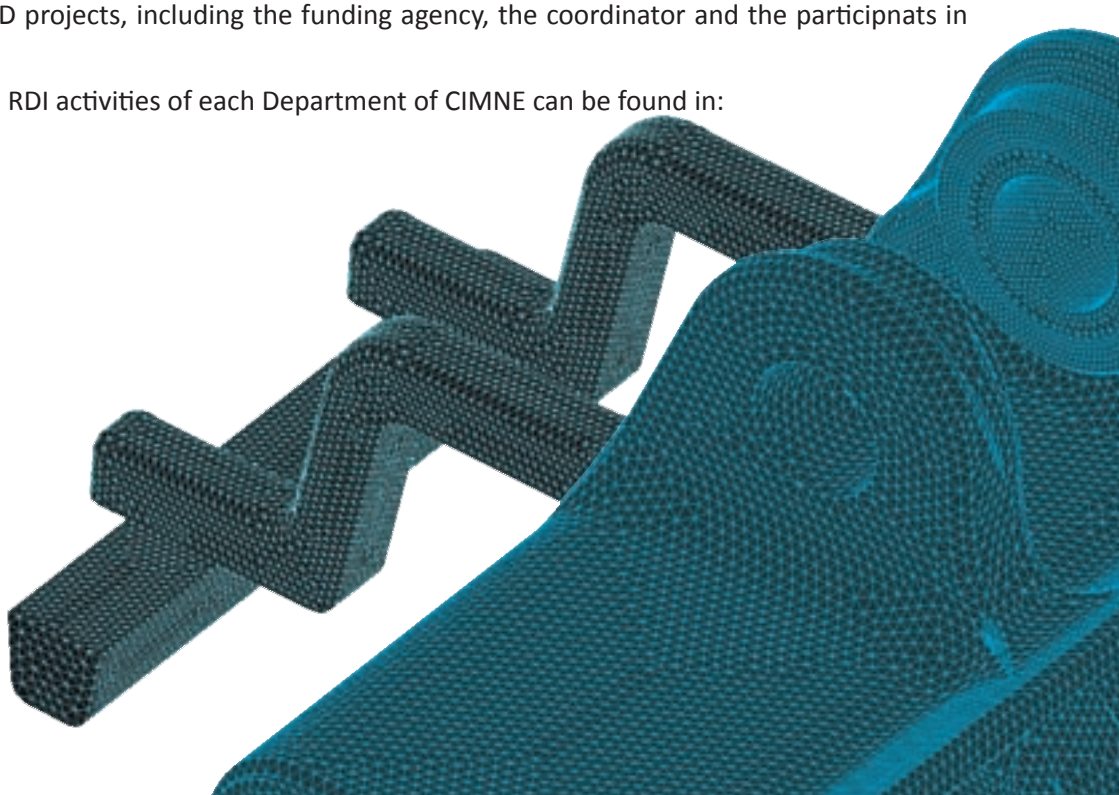
The research, development and innovation (RDI) activities at CIMNE are carried out by the following RDI Departments:

- Aerospace Engineering
- Civil Engineering
- Building, Energy and Environment (BEE GROUP)
- Marine and Naval Engineering
- Technology Tranfer Services
- Bio-Medical Engineering
- Socio-Economic Research
- Natura
- Pre and Post processing
- Information and Communication Technologies
- Computational physics and large scale computing

In the following pages we list the key objectives of each RDI Department, its staff and the more relevant on-going competitive RTD projects, including the funding agency, the coordinator and the participnats in the project.

More information on the RDI activities of each Department of CIMNE can be found in:

www.cimne.com



## Aerospace Engineering

The CIMNE Aeronautics Department is in charge of developing RTD projects in the aeronautical field, including:

- Unstructured grid stabilized finite element and meshless methods for analysis of fluid flows.
- 3D adaptive mesh refinement techniques for compressible/ incompressible flows.
- Optimum shape design in aerodynamics combined with adaptive mesh refinement.
- Structural analysis of composite aerospace structures under static and dynamic load.
- Aeroelastic analysis of parachutes.
- Pre/ post processing tools (GiD) for aerospace engineering problems
- 3D unstructured mesh generation
- Analysis data definition
- Visualisation of results
- New algorithms for multidisciplinary problems in aerospace engineering: aeroelasticity, thermal flows, electromagnetics, aeroacoustics, etc

### STAFF

Team Manager

Jordi Pons

Team

Pedro Díez
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### CONTACT ADDRESS

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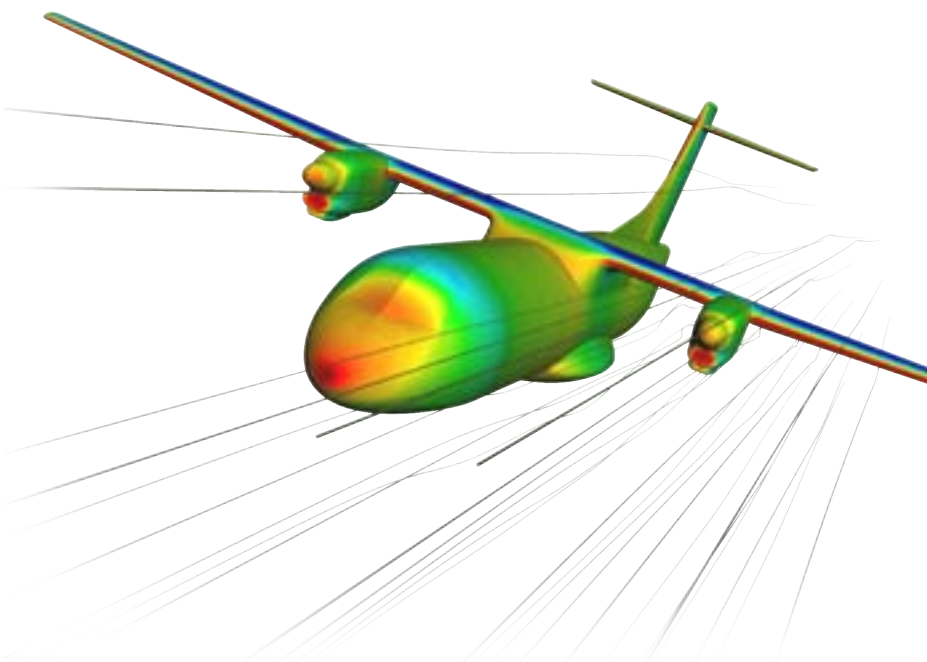

## ON-GOING RTD PROJECTS

### VALIANT: VALidation and Improvement of Airframe Noise prediction Tools

FP7
VKI (Coordinator) - EUROTURBO
IMM RAS - ECL - TUB - ONERA - TsAGI - NLR - DLR - CIMNE - NTS - NUMECA - LMS
01/09/2009 - 31/05/2013

### E-CAERO: European Collaborative Dissemination of Aeronautical research and applications

FP7
ECCOMAS (Coordinator)
VKI-EUROTURBO - DGLR - ERCOFTAC - EUCASS - EUROMECH
01/09/2009 - 31/10/2013

### MARS (FLOW CONTROL): Manipulation of Reynolds stresses for drag reduction and separation control

FP7
CIMNE (Coordinator)
UNIV. DE GRANADA - CEA - TAUK - LML - NAGRA - POSIVA - UTWENTE - IFG - QWED - LEI - UNU - EHS - EADS MAS - RUAG - SAXO - RSAS - OU - AIASCR - NDA [RWMD] - AND
01/10/2010 - 31/03/2014

### PARAPLANE: Development of a New Steerable Parachute System for Rescue of Small and Medium Size Airplanes

FP7
CIMSA (Coordinator)
SSBV - AIRLIGHT - Z2I - QUANTECH - CIMNE - DLR - NLR - FLIGHT DESIGN
01/12/2012 - 30/11/2014

### GRAIN 2: Greener Aeronautics International Networking

FP7
CIMNE (Coordinator)
BUAA - ACTRI - NPU - PKU - INRIA - AIRBUS ESPAÑA, S.L. - EADS IW - ROLLS ROYCE PLC - INGENIA, A.I.E. - NUMECA - USFD - CIRA - VKI-EUROTURBO - ATC - LEITAT - CAE - GTE (China) - AVIC ARI - FAI - ASRI - SAERI - AVIC BIAM - CERFACS - UCRAN - ALENIA
01/10/2013 - 30/09/2015

### UMRIDA: unCertainty quAntification Robust DesIgN Aeronautics

FP7
NUMECA (Coordinator)
MAN Turbo - TM - SATURN - ESTECO - ONERA - DLR - CIRA - CIMNE - INRIA - CERFACS - TUD - VRIJE UNIVERSITEIT BRUSSEL - WUT - EPFL - LIU - EADS IW - STANF - TU DRESDEN - DASSAULT - AIRBUS FRANCE - RR-D - ALENIA - AERMACCHI - ATKINS
01/10/2013 - 30/09/2016

# Civil Engineering

These are the main research lines that are being developed at the Civil Engineering Dept.

- Structural analysis of civil constructions under static and dynamic loads: bridges, dams, buildings, harbour structures, hydraulic structures, etc.
- Numerical methods for studying the safety and durability of structures in building and civil constructions.
- Development of decision support systems integrating wireless sensor networks, data bases, calculation methods and AI technology.
- Optimization methods in structural engineering.
- Finite element methods for analysis of textile membranes and inflatable structures.
- Computational methods for analysis of structures with new materials.
- Numerical methods for multidisciplinary problems in civil engineering.
- Integration of wireless sensors with analysis methods for structures and constructions.

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The Civil Engineering Dept. is organized into the following RTD groups:

### STRUCTURAL MECHANICS

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Francisco Zárate

### APPLIED MATHEMATICS

#### Coordinator

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Eloi Ruiz
José Sarrate

## GEOMECHANICS

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Mª Olimpia García
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María Dolores Zavala

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Allen Bateman
Juan P. Martín Vide
Vicente Mediana
Josep Dolz
Ernest Bladé

## OTHERS

Francesc López Almansa
Francesc Jordana

## RTD PROJECTS

### TECNO_FUS: Fusion Technology PROGRAMME-TECNO_FUS

LIA2. Proy.I+D: Investigación Fundamental
CIEMAT
CIMNE (Coordinator), UPM - UNED
01/02/2009 - 15/12/2013

### BESST: Breakthrough in European Ship and Shipbuilding Technologies

FP7
FINCANTIERI CANTIERI NAVALI IT., SPA. (Coordinator)
01/09/2009 - 28/02/2013

### AIR-BRIDGE: Development, validation and transfer to market of a prototype of AIR-BRIDGE for surface transport vehicles

PROVAT
CIMNE (Coordinator)
01/01/2012 - 31/12/2013

### CHAR-BIAX: Methods and techniques to characterize material strength, via Bi-axial Testing Devices coupled to Artificial Vision Measuring Systems.

QUANTECH (Coordinator)
CIMNE
01/01/2012 - 31/12/2013

### DYNASPHALT: Modelado y tratamiento dinámico de ensayos auscultación de firmes de carreteras

LIA6. Articulación e Internacionalización: Coop.Público-Privada
GEOTECNIA Y CIMIENTOS, S.A.
01/10/2010 - 28/02/2013

### E-CAERO: European Collaborative Dissemination of Aeronautical research and applications

FP7
ECCOMAS (Coordinator)
01/09/2009 - 31/10/2013

### HYPERMEMBRANE: Development of an adaptable structure for architecture application

FP7
CIMNE (Coordinator)
01/09/2011 - 31/08/2013

### FORGE: Fate of Repository Gases

FP7
BGS NERC (Coordinator), CIMNE.
01/02/2009 - 30/09/2013

HIRF SE: High Intensity Radiated Field Synthetic Environment
FP7
ALENIA (Coordinator), CIMNE + 15 partners
01/12/2008 - 31/05/2013

COLTS: Casting of Large Ti Structures
FP7
UNIV. OF BIRMINGHAM (Coordinator), CIMNE , ESI
01/10/2010 - 30/09/2013

e-DAMS: Métodos numéricos y experimentales para la evaluación de la seguridad y protección de las presas de materiales sueltos en situación de sobrevertido. Numerical and experimental techniques for safety assessment and protection of embankment dams in overtopping scenarios
LIA2. Proy.I+D: Investigación Fundamental
CIMNE
UPM - CEDEX
01/01/2011 - 31/12/2013

ALCON (INNPACTO): Desarrollo de criterios de diseño para el incremento de la capacidad de desagüe en presas de fábrica mediante aliviaderos con cajeros altamente convergentes
LIA6. Articulación e Internacionalización: Coop.Público-Privada
ALATEC (Coordinator)
01/10/2010 - 30/06/2013

HFLUIDS: Nuevos métodos de partículas y elementos finitos para problemas de interacción fluido-estructura en fluidos heterogéneos con superficie libre. Real Time Computational Mechanics Techniques for Multi-Fluid Problems
LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2011 - 31/12/2013

TENSABRIDGE: Nuevos puentes de despliegue rápido ultraligeros
LIA6. Articulación e Internacionalización: Coop.Público-Privada
BUILDAIR
CIMNE (Coordinator)
01/09/2011 - 31/12/2013

CIMNE-INTAL++: Dinamización de las sedes Internacionales de CIMNE en Latinoamérica, EEUU, China y Singapur
LIA6. Articulación e Internacionalización: Internacionalización
CIMNE (Coordinator)
01/10/2011 - 30/09/2013

AACC MUMOLADE: Multiscale Modelling of Landslides and Debris Flow
LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
25/01/2010 - 31/01/2013

EHEA: Estructura Hinchable Energéticamente Autosuficiente
LIA6. Articulación e Internacionalización: Coop.Público-Privada
BUILDAIR (Coordinator)
CIMNE - OPTIMA
01/10/2012 - 30/09/2014

COPASRE: Enfoque integral y probabilista para la evaluación del riesgo sísmico en España
LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2012 - 31/12/2014

ROMSCALE: Modelado multiescala del comportamiento mecánico y de fallo estructural en materiales, utilizando técnicas de reducción de modelos
LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2012 - 31/12/2014

XLIDE: Desarrollo de Herramientas para el Análisis de Estabilidad en Laderas con Riesgo Potencial sobre Infraestructuras
LIA6. Articulación e Internacionalización: Coop.Público-Privada
OFITECO S.A. (Coordinator)
01/07/2011 - 31/12/2014

M-RECT: Multiscale reinforcement of semi-crystalline thermoplastic sheets and honeycombs
FP7
VICTREX (Coordinator)
15/04/2010 - 14/04/2014

ACUÑA: Desarrollo de un prototipo de bloque en forma de cuña y de la metodología para su uso como protección frente a la erosión en presas o balsas de materiales sueltos
LIA6. Articulación e Internacionalización: Coop.Público-Privada
PREHORQUI (Coordinator) - CIMNE
01/09/2011 - 30/06/2014

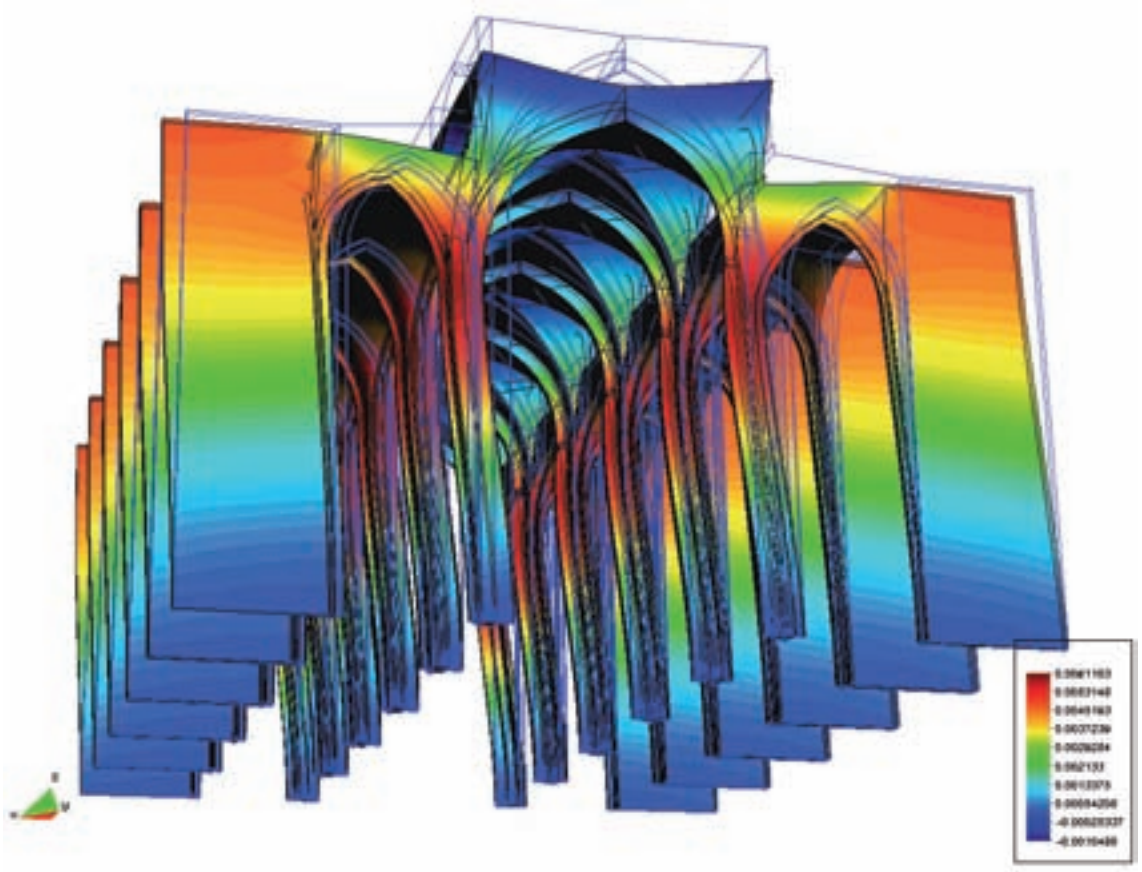
MMEX: Multimedia Mobile Experience (Carpa multimedia)
LIA6. Articulación e Internacionalización: Coop.Público-Privada
BUILDAIR (Coordinator)
TAOC - CIMNE
01/10/2012 - 31/12/2014

ULCF: Ultra low cycle fatigue of steel structures under high strain transient loading conditions
RFCS-Research Fund for Coal and Steel
FLUP (Coordinator)
SZMF - CSM - OCAS - CIMNE - UThessaly - RWTH - CPR
01/07/2011 - 30/06/2014

REALTIME: Real Time Computational Mechanics Techniques for Multi-Fluid Problems
EUROPEAN RESEARCH COUNCIL
CIMNE (Coordinator)
01/12/2009 - 30/11/2014

SAFER: Optimización de los Sistemas de Aislamiento Ferroviario
LIA6. Articulación e Internacionalización: Coop.Público-Privada
COMSA (Coordinator) - CIMNE
01/07/2011 - 30/04/2014

PARAPLANE: Development of a New Steerable Parachute System for Rescue of Small and Medium Size Airplanes
FP7
CIMSA (Coordinator) - CIMNE - DLR
01/12/2012 - 30/11/2014



CHANGES: Changing Hydro-Meteorological Risks- As Analyzed by A New Generation of European Scientists
FP7
UTWENTE (Coordinator)
01/01/2011 - 31/12/2014

PEBS: Long-Term Performance of Engineered barrier Systems
FP7
BGR (Coordinator) - CIMNE
01/03/2010 - 28/02/2014

MARS (FLOW CONTROL): Manipulation of Reynolds stresses for drag reduction and separation control
FP7
CIMNE (Coordinator) + 15 partners from Europe and China
01/10/2010 - 31/03/2014

DESURBS: Planning, (re)design and re(engineering) of urban areas to make them less vulnerable and more resilient to security threats
FP7
Resman (Coordinator) - CIMNE
01/01/2011 - 31/12/2014

BALAMED: Modelación numérica del conjunto carril-traviesa-balasto mediante el Método de los Elementos Discretos
LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2013 - 31/12/2015

ULITES: Ultra-lightweight structures with integrated photovoltaic solar cells: design, analysis and application to an emergency shelter prototype
FP7
BUILDAIR (Coordinator) - CIMNE - Univ. di Padova
07/01/2013 - 06/01/2015

SODDAT (2012): Simulación numérica de la distorsión óptica debida a la turbulencia atmósferica
LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2013 - 31/12/2015

iCOMPLEX: Desarrollo del Software iCOMPLEX para el control y evaluación de la seguridad de infraestructuras críticas.
LIA6. Articulación e Internacionalización: Coop.Público-Privada
DACARTEC (Coordinator)
CIMNE - UPM
01/09/2012 - 31/12/2015

POLILAB: Diseño del prototipo de una compuerta fusible recuperable tipo laberinto de fondo poliédrico para la mejora de la seguridad hidrológica de las presas (POLILAB).
LIA6. Articulación e Internacionalización: Coop.Público-Privada
JGICSA (Coordinator)
UPM - CIMNE - VEMSA - CEDEX
01/09/2012 - 31/12/2015

WAM-V: advanced numerical simulation and performance evaluation of wave adaptive modular vessels (WAM-V®) in spray generating conditions
Office for Naval Research (USA)
CIMNE (Coordinator)
01/07/2012 - 30/06/2015

MUMOLADE: Multiscale Modelling of Landslides and Debris Flows
FP7
BOKU (Coordinator) - CIMNE + 15 partners
01/01/2012 - 31/12/2015

COMFUS: Computational Methods for Fusion Technology
European Research Council
CIMNE (Coordinator)
01/01/2011 - 31/12/2015

SAFECON: New Computational Methods for Predicting the security of constructions to Water Hazards accounting for fluid-soil-structure interactions
European Research Council
CIMNE (Coordinator)
01/01/2011 - 31/12/2015

GRAIN 2: Greener Aeronautics International Networking
FP7
CIMNE (Coordinator)
BUAA - ACTRI - NPU - PKU - INRIA - AIRBUS ESPAÑA, S.L. - EADS IW - ROLLS ROYCE PLC - INGENIA, A.I.E. - NUMECA - USFD - CIRA - VKI-EUROTURBO - ATC - LEITAT - CAE - GTE (China) - AVIC ARI - FAI - ASRI - SAERI - AVIC BIAM - CERFACS - UCRAN - ALENIA
01/10/2013 - 30/09/2015

TOTAL.KNEE: Development of a new generation of knee prostheses with enhanced lifespan features using advanced computational biomechanics
FP7
CIMNE (Coordinator)
01/04/2012 - 31/03/2016

FLEXICAST: Robust, and FLEXible CAST iron manufacturing
FP7
UPC (Coordinator), CIMNE + 12 partners
01/11/2012 - 31/10/2016

EUNISON: Extensive UNIfied-domain SimulatiON of the Human Voice
FP7
KTH (Coordinator), CIMNE + 10 partners
01/03/2013 - 29/02/2016

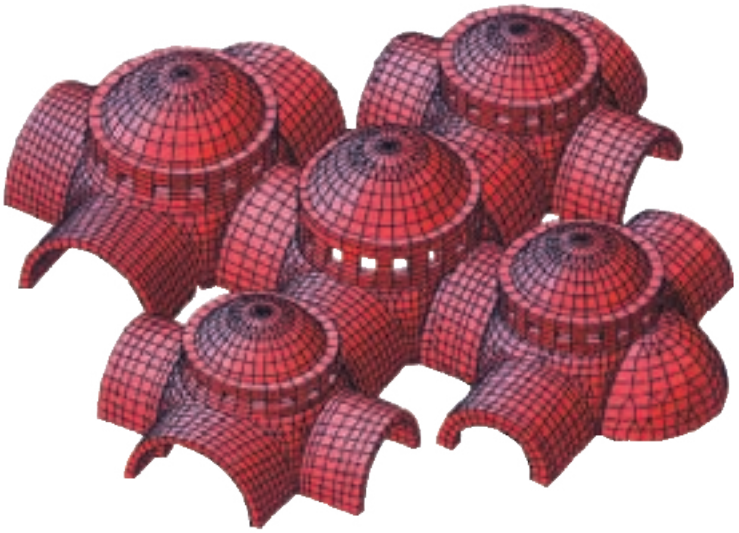
ICMEG: Integrative Computational Materials Engineering expert group
FP7
ACCESS e.V. (Coordinator)
IMDEA - Thermo-Calc Software - M2i - CESKOSLOVENKE AEROLINE CSA - RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN - CIMNE - simufact - K&S - e-Xstream engineering
01/10/2013 - 30/09/2016

UMRIDA: unCertainty quAntification Robust DesIgN Aeronautics
FP7
NUMECA (Coordinator)
MAN Turbo - TM - SATURN - ESTECO - ONERA - DLR - CIRA - CIMNE - INRIA - CERFACS - TUD - VRIJE UNIVERSITEIT BRUSSEL - WUT - EPFL - LIU - EADS IW - STANF - TU DRESDEN - DASSAULT - AIRBUS FRANCE - RR-D - ALENIA - AERMACCHI - ATKINS
01/10/2013 - 30/09/2016

NUMEXAS: Numerical methods and tools for key exascale computing challenges in engineering and applied sciences
FP7
CIMNE (Coordinator)
CESCA - LUH - NTUA - QUANTECH
01/10/2013 - 30/09/2016

SOLARNET: High-Resolution Solar Physics Network
FP7
IAC (Coordinator), CIMNE
01/04/2013 - 31/03/2017

COMP-DES-MAT: Advanced tools for computational design of engineering materials
European Research Council
CIMNE (Coordinator)
01/02/2013 - 31/01/2018



# Building, Energy and Environment (BEE GROUP)

The Building, Energy and Environment Group (BEE Group) was founded in 2001. Its R&D activities are focused on the field of renewable energies and energy efficeincy. Their main research lines are:

- Numerical methods for analysis and design of energy sustainable buildings and constructions.
- Numerical methods for acoustic analysis and design of structures with enhanced materials.
- Methods for analysis of recycling processes of natural and artificial wastes for energy saving and environmental applications.
- Development of decision support systems in the energetic and environment sectors integrating wireless sensors, networks, databases, info-mechanical systems, computer simulation methods and AI technology.
- Development of computational methods for analysis and design of wave power plants.

## STAFF

Team Manager
Jordi Cipriano

Team
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## RTD PROJECTS

### AACC BIPV/PCM-Slurry: Developing a novel BIPV façade module enabling enhanced solar thermal/electrical efficiency

LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2010 - 31/01/2013

### BECA: Balanced European Conservation Approach – ICT services for resource saving in social housing

CIP-Competitiveness and Innovation Framework Programme
EMPIRICA (Coordinator), CIMNE
01/01/2011 - 31/12/2013

### eSESH: Saving Energy in Social Housing with ICT

CIP-Competitiveness and Innovation Framework Programme
EMPIRICA (Coordinator), CIMNE
01/03/2010 - 28/02/2013

### SEMANCO: S. Tools for Carbon Reduction in Urban Planning

FP7
FUNITEC (Coordinator), CIMNE
01/09/2011 - 31/08/2014

### SMART SPACES: Saving Energy in Europe's Public Buildings

CIP-Competitiveness and Innovation Framework Programme
EMPIRICA (Coordinator), CIMNE
01/01/2012 - 31/12/2014

### PARANAT: Análisis paramétrico de sistemas de ventilación natural en edificios.

LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/12 - 31/12/2014

### AIDA: Affirmative Integrated Energy Design Action

CIP-Competitiveness and Innovation Framework Programme
TU WIEN (Coordinator), CIMNE
01/04/2012 - 31/03/2015

### EMPOWERING: Empowering households to save energy by informative billing

CIP-Competitiveness and Innovation Framework Programme
CIMNE (Coordinator) + 10 partners
01/04/2013 - 30/09/2015

### ENCERTICUS: Energy Certification, Technology, Information and Communication for User Benefit

Med Programme.ENVIRONMENT
CIMNE (Coordinator) + 7 partners
01/03/2013 - 30/06/2015

## Marine and Naval Engineering

The main RTD lines of the Marine and Naval Engineering Department are:

- Numerical methods for hydrodynamic analysis of vessels.
- Finite element methods for analysis of composite materials and structures in ships accounting for fluid-structure interaction effects.
- Numerical methods for analysis of off-shore constructions accounting for fluid-structure interaction effects.
- Numerical methods for environmental problems in naval and marine engineering.
- Optimum shape design methods for ships
- Numerical methods for multidisciplinary problems in naval and marine engineering.
- Development of decision support systems in naval and marine engineering, integrating wireless sensor networks, data bases, computer simulation methods and AI technology (neuronal networks).

### STAFF

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### RTD PROJECTS

MIELE: Mediterranean Interoperability E-services for Logistics and Environment sustainability

TEN-T (Trans-European Transport Network)
RINA (Coordinator), CIMNE + 4 partners
01/09/2010 - 31/12/2013

BESST: Breakthrough in European Ship and Shipbuilding Technologies

FP7
FINCANTIERI CANTIERI NAVALI IT., SPA. (Coordinator)
CIMNE + 7 partners
01/09/2009 - 28/02/2013

TrainMoS: Training Motorways of the Sea

TEN-T (Trans-European Transport Network)
UPM (Coordinator), CIMNE + 10 partners
15/01/2012 - 31/12/2013

WiderMoS: Wide Interoperability and new governance moDels for freight Exchange linking Regions through Multimodal maritime based cOrridorS

TEN-T (Trans-European Transport Network)
La Spezia Port Authority (Coordinator), CIMNE + 6 partners
01/06/2013 - 31/12/2015

MONALISA 2.0

TEN-T (Trans-European Transport Network)
Swedish Maritime Administration (Coordinator)
CIMNE + 7 partners
01/01/2012 - 31/12/2015

# Technology Tranfer Services

The CIMNE TTS department works on:

- Finite element method for analysis of sheet stamping processes.
- Finite element methods for analysis of mould filling, solidification and cooling in casting processes.
- Numerical methods for life predictions of manufactured parts.
- Optimum design methods for manufacturing processes in metal and plastic industry.
- Finite element methods for simulation of welding and riveting processes.
- Decision support systems in forming and manufacturing industries integrating wireless sensor networks, databases, computer simulation methods and AI technology (neuronal networks).
- Numerical methods for multidisciplinary problems in the manufacturing industry.

## STAFF

### Team Manager

Oscar Fruitós

### Team

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Josep Cervelló
Martí Coma
Hector Gabriel Espinoza
Luis Jorge Fernández
Alberto Férriz
Francisco Javier Gárate
Mercè López
Jaume Miró
Fernando Mónaco
Javier Roca
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Gustavo Zambrano

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## RTD PROJECTS

### FER: Fabricació a Europa i regions d'interés

CONES
CIMNE (Coordinator)
12/04/2011 - 11/10/2013

### HYPERMEMBRANE: Development of an adaptable structure for architecture applications

FP7
CIMNE (Coordinator) + 6 partners
01/09/2011 - 31/08/2013

# Bio-Medical Engineering

The mission of the Bio-Medical Department of CIMNE is to create a fusion of engineering and the medicine that promotes scientific discovery and the development of new technologies and therapies through research and education. The Bio-Medical Departament of CIMNE works in the areas listed below:

- Development of numerical methods for modelling and simulation of biomechanical and bio-medical engineering problems.
- Simulation of the mechanics of the cardiovascular system.
- Study of the mechanics of the urology system.
- Fluid-dynamic analysis of the blood flow in vessels.
- Decision support system in bio-medical engineering.
- Study of the heart mechanics.
- Biomedical signal
- Image processing

## STAFF

### Team Manager

Eduardo Soudah

### Team

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Jorge S. Pérez

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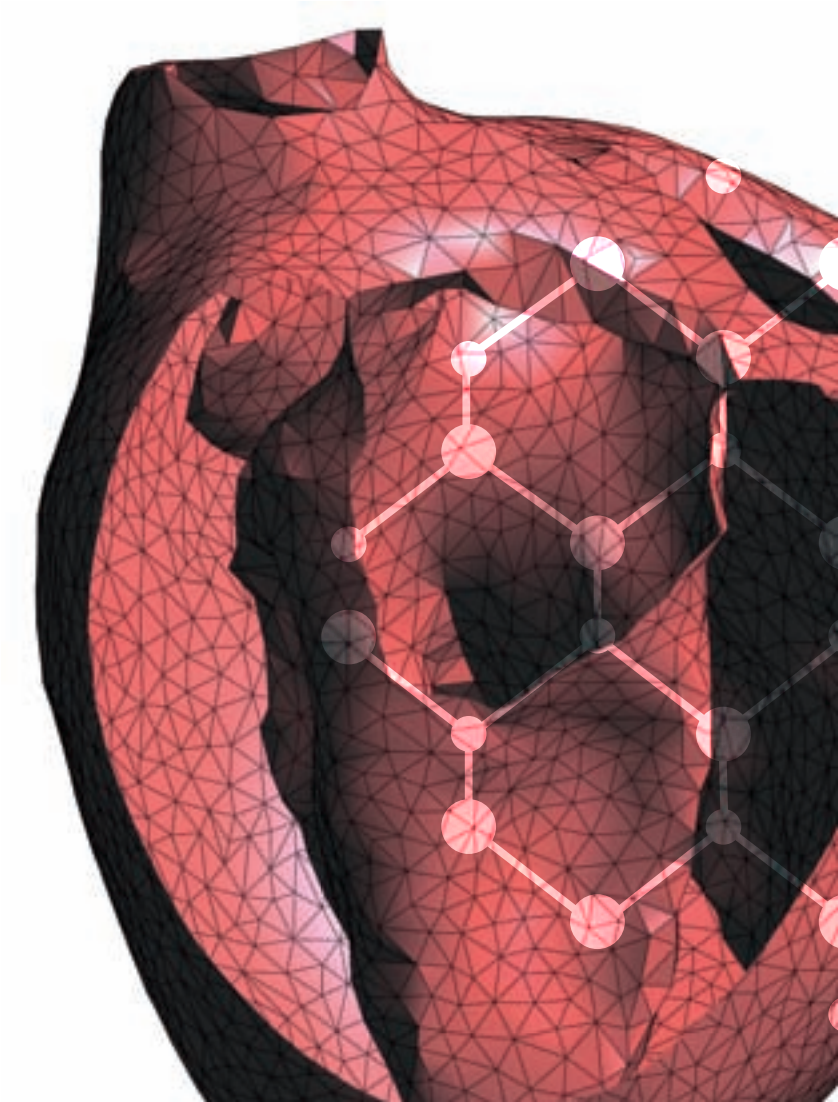
## RTD PROJECTS

### CHIRON: Cyclic and person-centric Health management: Integrated appRoach for hOme, mobile and clinical eNvironments

FP7-ARTEMIS-JU
FIMI (Coordinator), CIMNE + 7 partners
01/03/2010 - 30/11/2013

### WITH ME: The European Platform to Promote Healthy Lifestyle and improve care through a Personal Persuasive Assistant

FP7-ARTEMIS-JU
ATOS (Coordinator), CIMNE + 6 partners
01/06/2013 - 31/05/2016



## Socio-Economic Research

The Socio Economic Research department works in a range of scientific disciplines from information technology and finance to human behaviour, the social sciences, and humanities. The interest and focus is on financial capability, learning technologies, agent-based modelling, and systemic financial risk.

- *Financial capability:* We collaborate with our partners on conceptual work, lab and survey studies, and game development around financial education and financial behaviour. And we work on reaching key public decision makers with the results of our research and development activities.
- *Agent-based modelling of financial systems:* We conceptualise and develop network and agent-based models of financial systems. Our work focuses on methodology primarily, and we use model building and simulation of financial crisis episodes as a vehicle for that work.
- *Games, psychology, and finance:* We develop games for measuring psychological traits, and for learning cognitive and emotion skills. We collaborate with our partners to evaluate these games in lab experiments and in survey studies. Our exploratory work in this area aims to strengthen the link between psychology, pedagogy, and game design.
- *Systemic risk:* A practical aspect of our work in this area is to explore how systemic risk indicators affect market dynamics through mixed network and agent-based simulations, and hence links into our methodological work on agent-based models.

### STAFF

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Gilbert Peffer

Team

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Barbara Llacay

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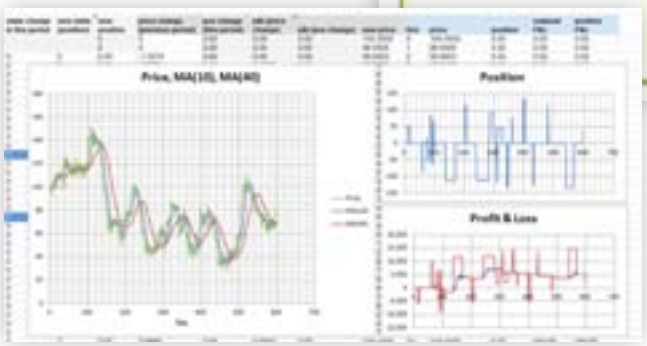
## RTD PROJECTS

### LAYERS: Learning Layers - Scaling up Technologies for Informal Learning in SME Clusters

FP7
CIMNE (Coordinator)
NORTAL - AALTO - TRIBAL - I-PERFORM - AGENTUR - BauABC - NHS - TLU - TUG - HsKA - UIBK - UWE - RWTH - PONT - UNIVERSITY OF LEEDS - ITB
01/11/2012 - 31/10/2016

### NUMEXAS: Numerical methods and tools for key exascale computing challenges in engineering and applied sciences

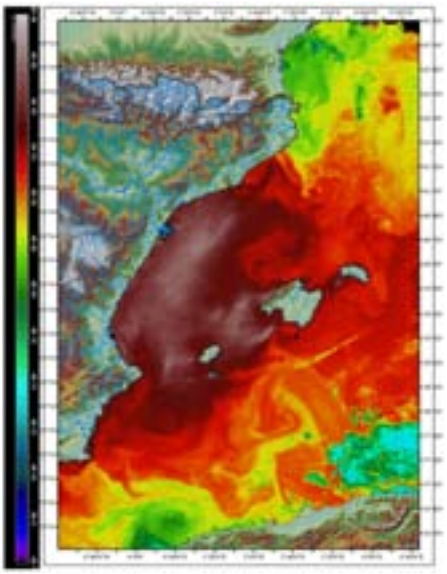
FP7
CIMNE (Coordinator)
CESCA - LUH - NTUA - QUANTECH
01/10/2013 - 30/09/2016

# Natura

The main activity of the CIMNE-Natura department is to advance knowledge and technology in global environmental research by bringing together and managing skilled scientists and engineers to develop strategic and applied environmental solutions. The main RTD lines of the group are:

- Water desalination and purification
- Chemical methods for energy storage
- Climate adaptation
- Risk events studies



## STAFF

### Team Manager

Pedro Arnau

### Team

Naeria Navarro
Ignacio Valero

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## RTD PROJECTS

### NEUROLINGUA: Plataforma de estimulación y rehabilitación de las alteraciones del lenguaje basada en fundamentos de neurociencia cognitiva.

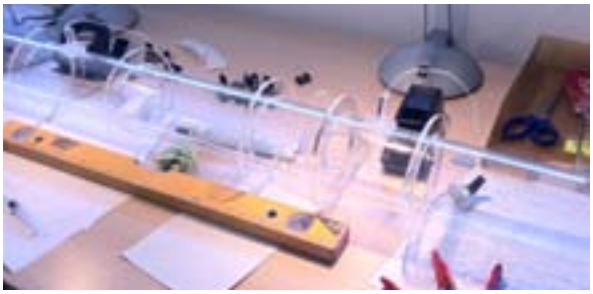
LIA6. Articulación e Internacionalización: Coop.Público-Privada
CIMNE (Coordinator)
01/06/2011 - 31/12/2013

### JUST4ME: Just-in-time and just-for-me: hacia la autogestión del aprendizaje en un entorno personal ubicuo

LIA6. Articulación e Internacionalización: Coop.Público-Privada
ICA (Coordinator), CIMNE + 5 partners
01/06/2011 - 30/06/2014

### NEREIDAS: Implementation of environmental restoration techniques for dimishing the environmental impacts of ports: steps towards a new certification.

TEN-T (Trans-European Transport Network)
Melilla Port Authority (Coordinator), CIMNE + 4 partners
01/08/2013 - 31/12/2015



## Pre and Post processing

The Pre and Postprocessing GiD department works on the development of advanced methods for efficient generation of data for numerical simulations and visualization of computational results. These are the main research lines:

- Development and maintenance of the GiD pre and post processing system (www.gidhome.com).
- Development of methods for generating structured and unstructured meshes.
- Development of input data technology for large scale computational problems.
- Graphical visualization techniques for large scale simulation problems.
- Generation of input data for finite element analysis from medical images.
- Integrations of geographical information systems (GIS) with pre and post processing tools and finite element analysis codes.
- Meshless methods for the parametrization of geometries for shape optimization problems.

### STAFF

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Team
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### RTD PROJECTS

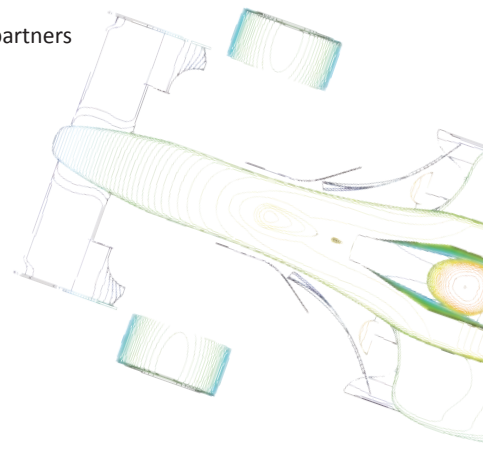
CLOUD: Optimización de procesos de fabricación mediante aplicaciones cloud computing
LIA6. Articulación e Internacionalización: Coop.Público-Privada
QUANTECH (Coordinator), CIMNE
01/09/2011 - 31/12/2013

HIRF SE: High Intensity Radiated Field Synthetic Environment
FP7
ALENIA (Coordinator), CIMNE + 12 partners
01/12/2008 - 31/05/2013

HYPERMEMBRANE: Development of an adaptable structure for architecture application
FP7
CIMNE (Coordinator) + 5 partners
01/09/2011 - 331/08/2013

EHEA: Estructura Hinchable Energéticamente Autosuficiente
LIA6. Articulación e Internacionalización: Coop.Público-Privada
BUILDAIR (Coordinator)
CIMNE, OPTIMA
01/10/2012 - 30/09/2014

VELaSSCo: Visualization for Extremely Large-Scale Scientific Computing
FP7
CIMNE (Coordinator) + 7 partners
01/01/2014 - 31/12/2016



## Information and Communication Technologies

This group is currently working on:

- Development of Internet tools for supporting management and training activities of individuals and organizations
- Methods for integrating and managing wireless sensors in Internet platforms.
- Development of health monitoring methods for constructions and buildings using wireless sensors and ICT.
- Development and integration of geographic informations tools into decision support systems.
- Development of decision support systems integrating wireless sensors, networks, data bases, info-mechanics systems, computer simulation methods and AI technology.
- Application of ICT to manufacturing processes in industry.

### STAFF

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Jordi Jiménez

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Alexis Cid
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Francesc Jerez
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Albert Pla
Ángel Diego Priegue
Andreu Tarracó
Alberto Tena
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Claudio Zinggerling

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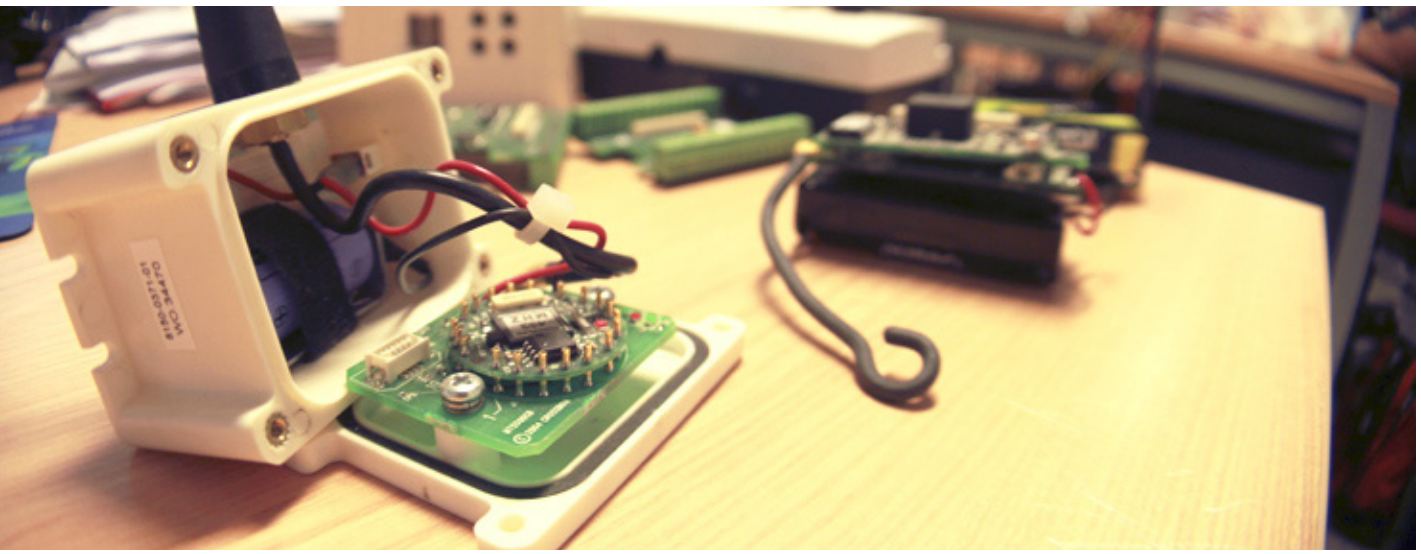


## RTD PROJECTS

MOS4MOS: Monitoring and Operation Services for Motorways of the Sea.
TEN-T (Trans-European Transport Network)
VALENCIAPORT (Coordinator), CIMNE + 6 partners
21/03/2011 - 31/05/2012

NEUROLINGUA: Plataforma de estimulación y rehabilitación de las alteraciones del lenguaje basada en fundamentos de neurociencia cognitiva.
LIA6. Articulación e Internacionalización: Coop.Público-Privada
ICA (Coordinator), CIMNE + 7 partners
01/06/2011 - 31/12/2013

DYNACAR: Técnicas para el diseño dinámico de infraestructuras de carreteras
LIA6. Articulación e Internacionalización: Coop.Público-Privada
COPASA (Coordinator), CIMNE
01/10/2011 - 31/12/2013

JUST4ME: Just-in-time and just-for-me: hacia la autogestión del aprendizaje en un entorno personal ubicuo
LIA6. Articulación e Internacionalización: Coop.Público-Privada
ICA (Coordinator), CIMNE
01/06/2011 - 31/12/2013

CHIRON: Cyclic and person-centric Health management: Integrated appRoach for hOme, mobile and clinical eNvironments
FP7-ARTEMIS-JU
FIMI (Coordinator), CIMNE
01/03/2010 - 30/11/2013

BESST: Breakthrough in European Ship and Shipbuilding Technologies
FP7
FINCANTIERI CANTIERI NAVALI IT., SPA. (Coordinator), CIMNE + 10 partners
01/09/2009 - 28/02/2013

MIELE: Mediterranean Interoperability E-services for Logistics and Environment sustainability
TEN-T (Trans-European Transport Network)
RINA (Coordinator), CIMNE + 6 partners
01/09/2010 - 31/12/2013

E-CAERO: European Collaborative Dissemination of Aeronautical research and applications
FP7
ECCOMAS (Coordinator), CIMNE + 7 partners
01/09/2009 - 31/10/2013

DOTNAC: Development and optimization of THz NDI on aeronautics composite multi-layered structures
FP7
RMA (Coordinator), CIMNE + 6 partners
01/09/2010 - 31/08/2013

TrainMoS: Training Motorways of the Sea
TEN-T (Trans-European Transport Network)
UPM (Coordinator), CIMNE + 5 partners
15/01/2012 - 15/10/2013

DESURBS: Planning, (re)design and re(engineering) of urban areas to make them less vulnerable and more resilient to security threats
FP7
Resman (Coordinator), CIMNE + 6 partners
01/01/2011 - 30/12/2014

MONALISA 2.0
TEN-T (Trans-European Transport Network)
Swedish Maritime Administration (Coordinator)
CIMNE + 7 partners
01/01/2012 - 31/12/2015

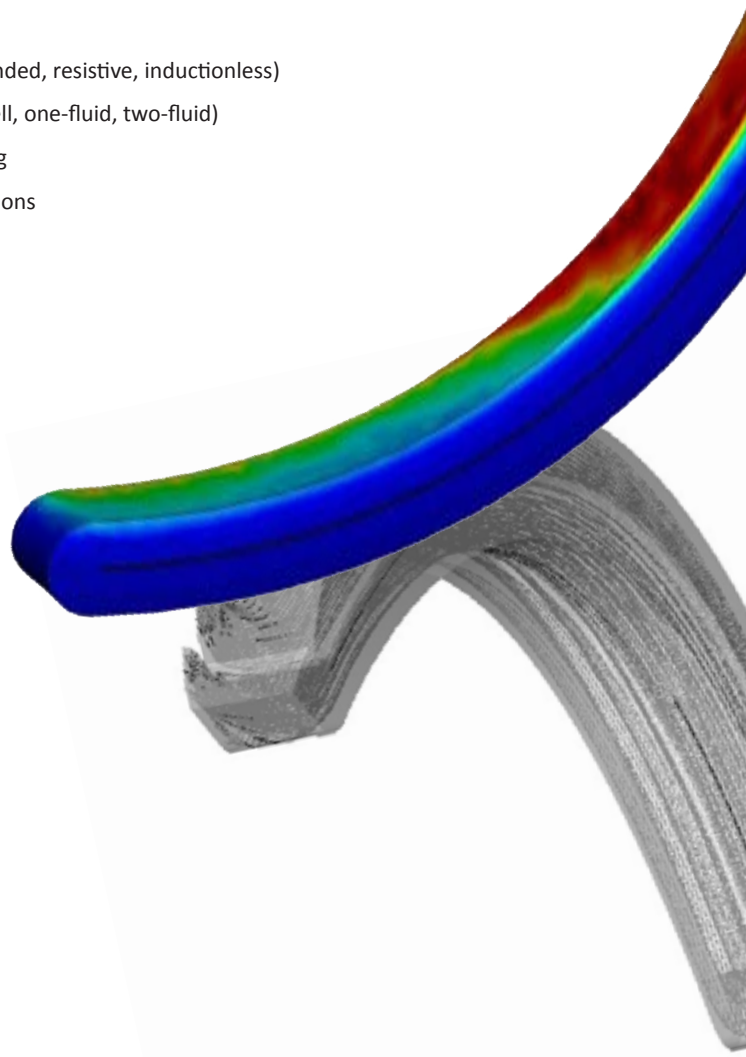
NEREIDAS: Implementation of environmental restoration techniques for dimishing the environmental impacts of ports: steps towards a new certification.
TEN-T (Trans-European Transport Network)
Melilla Port Authority (Coordinator), CIMNE + 6 partners
01/08/2013 - 31/12/2015

WiderMoS: “Wide Interoperability and new governance moDels for freight Exchange linking Regions through Multimodal maritime based cOrridorS”
TEN-T (Trans-European Transport Network)
La Spezia Port Authority (Coordinator), CIMNE + 5 partners
01/06/2013 - 31/12/2015

# Computational physics and large scale computing

These are the main research lines:

- New finite element formulations for magnetohydrodynamics (extended, resistive, inductionless)
- New finite element formulations for plasma physics (Vlasov-Maxwell, one-fluid, two-fluid)
- Scalable domain decomposition algorithms based on substructuring
- Physics-based preconditioning techniques for multiphysics applications
- High performance scientific computing



## STAFF

### Team Manager

Santiago Badía

### Team

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Alba Hierro
Alberto Francisco Martín
Elisabeth Mas
Marc Olm
Rubén Otín
Ramón Planas
Ricardo Javier Príncipe

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## RTD PROJECTS

### TECNO_FUS: Fusion Technology PROGRAMME-TECNO_FUS

LIA2. Proy.I+D: Investigación Fundamental
CIEMAT (Coordinator)
CIMNE - UPM - UNED
01/02/2009 - 15/12/2013

### VALIANT: VALidation and Improvement of Airframe Noise prediction Tools

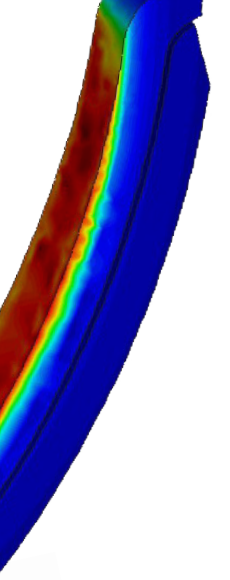
FP7
VKI-EUROTURBO (Coordinator), CIMNE + 6 partners
01/09/2009 - 31/05/2013

### FUSIM: Herramientas computacionales para interacción solidometal líquido. Aplicación al diseño de módulos de ensayo de envoltura líquida

LIA2. Proy.I+D: Investigación Fundamental
CIMNE (Coordinator)
01/01/2012 - 31/12/2014

### COMFUS: Computational Methods for Fusion Technology

FP7
CIMNE (Coordinator)
01/01/2011 - 31/12/2015



# INNOVATION AND TECHNOLOGY TRANSFER

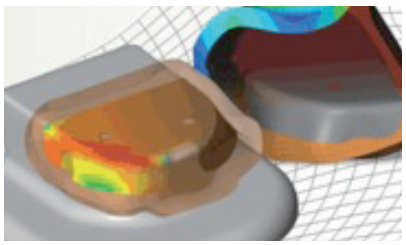
# CIMNE products

We describe below the products developed and marketed entirely by CIMNE or in collaboration with companies.

## SIMULATION SOFTWARE

### MANUFACTURING PROCESSES

#### STAMPACK

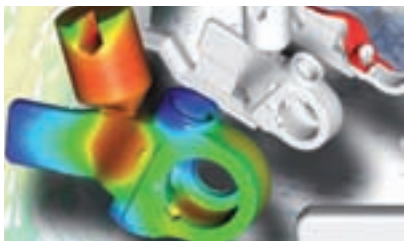


Sheet metal forming processes. Developed by Quantech ATZ, SA. in cooperation with CIMNE.

Marketed by Quantech ATZ, SA since 1999

www.quantech.es

#### VULCAN



Casting and foundry processes.

Developed by Quantech ATZ, SA. in cooperation with CIMNE.

Marketed by Quantech ATZ, SA since 2001

www.quantech.es

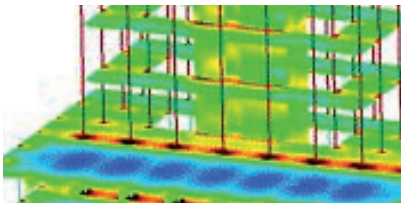
#### WELDPACK

Welding processes.

Developed by CIMNE

### STRUCTURAL ENGINEERING

#### RAMSERIES



Finite element code for analysis of structures in engineering and architecture.

Developed by Compass Ingeniería y Sistemas, SA. in cooperation with CIMNE.

Marketed by Compass Ingeniería y Sistemas, SA. since 2003

www.compassis.com

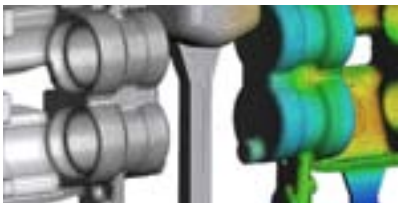
#### DEMPACK

Analysis of granular systems and multifracturing problems in geomechanics and industrial processes using discrete and finite element methods.

Developed by CIMNE

www.cimne.com/dem

#### COMET



Finite element code for non linear analisys of thermomechanical problems in solid and structural mechanics acounting for frictional contact situations.

Developed at CIMNE

www.cimne.com/comet

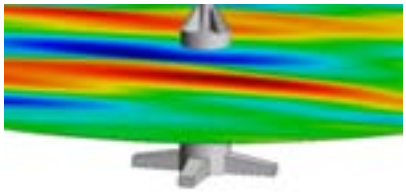
## FLUID DYNAMICS

### TDYN

Finite element code for analysis of a wide range of multi-physic problems in engineering and applied science (fluid dynamics, heat transfer, fluid-structure interaction, etc.)

Developed by Compass Ingeniería y Sistemas, SA. in cooperation with CIMNE. Marketed by Compass since 2003
www.compassis.com

### SEAFEM

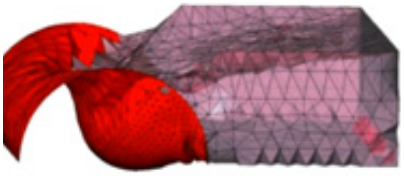


Hydrodynamics and seakeeping analysis of ships and marine structures. Application to wind tower generators in the sea.

Developed by Compass Ingeniería y Sistemas, SA. in cooperation with CIMNE. Marketed by Compass since 2011
www.compassis.com

## MULTI-PHYSICS

### KRATOS



Kratos is an open object-oriented software platform for the development and application of finite element codes for multidisciplinary applications in engineering and applied science.

Developed by CIMNE

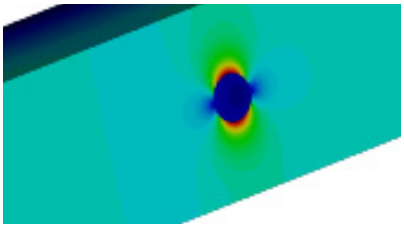
www.cimne.com/kratos

### PFIRE

Analysis of propagation of fire and its effect on the burning and melting of objects.

Developed by CIMNE

### ERMES



Computational electromagnetics using advanced finite element methods

Developed by CIMNE

http://www.gidhome.com/gid-plus/modules/research-modules/373-ermes

### CLICK2CAST

Fast simulation of casting precesses.

Developed by Quantech ATZ in cooperation with CIMNE

Marketed by Quantech ATZ since 2013
www.click2cast.com

## BIO-MECHANICS and HEALTH

### Health App

App to control eating disorders.

Developed by HealthApp SL in cooperation with CIMNE

### BodyGiD

Multiscale representation and analysis of the human body.

Developed by CIMNE

# DECISION SUPPORT SYSTEMS

## BEACHING

Information system for management of tourism activities in beach areas.

Developed by CIMNE and marketed by TAOC SA since 2011

www.beaching.com

## SIE

Information system for management of energy consumption in public buildings and municipalities.

Developed by CIMNE

Marketed by Gassó Auditors SL and CIMNE since 2005

## OPEN NN

Artificial neuronal network package.
Developed by CIMNE
www.cimne.com/flood

## ROBOCOPT

Interpolated platform for robust optimization in engineering.

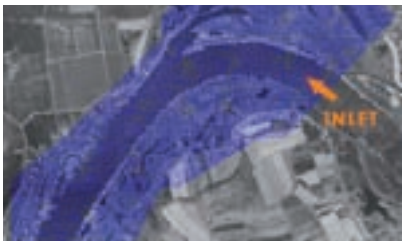
Developed by CIMNE

## ROEM

Information system for assessment of the environmental quality in reservoirs and lakes.

Developed by CIMNE

## RAMFLOOD




Decision support system (DSS) for risk assessment and managing of floods.

Developed by CIMNE and FLUMEN

www2.cimne.com/ramflood

## GIS+


Web-based interactive Geographic Information System.

Developed by CIMNE

## ETESTING

Web-based platform for e-management of experimental tests.

Developed by CIMNE and Applus

## WSNP

An integrated platform for e-monitoring using wireless sensor network technology.

Developed by CIMNE

www2.cimne.com/wsnp

# PRE AND POST PROCESSING SOFTWARE

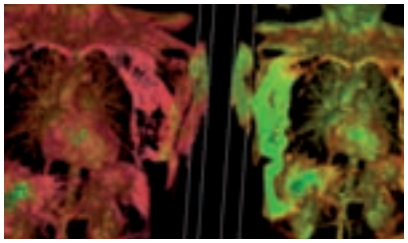
## GID

A universal and adaptive pre and postprocessor for computer simulation in engineering and applied science.

Developed & marketed by CIMNE since 1998

www.gidhome.com/

## DIPPO



Digital image processing platform.

Developed and marketed by CIMNE since 2011

# COLLABORATIVE WORK PLATFORMS

## SIGPRO

Integrated software platform for the management of the research and financial activities and reports in RTD projects.

Developed by CIMNE

## Mi colegio en red (MCR)

Integrated communications and services system for schools via the Internet.

Developed by CIMNE, Since 2000

## LHINGS

Lhings is a cloud platform designed to provide access and links to all kind of things and let users management, share and interact with those things anywhere and when they like.

Developed and marketed by Lyncos SL in cooperation with CIMNE

www.lhings.com

## FRAKTALIS


Fully customizable Web application that creates virtual communities where users can communicate, share information and work collaboratively.

Developed & marketed by CIMNE since 2009

www.fraktalis.com

# ENGINEERING SYSTEMS AND HARDWARE

## Inflatable structures

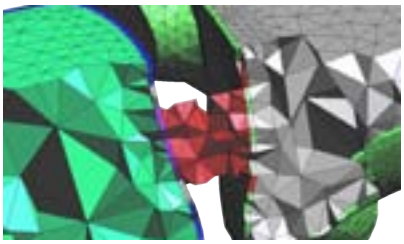
Inflatable pavilions, shelters and bridges for applications in engineering and architecture.

Developed by Building Ingenieria y Arquitectura SL in cooperation with CIMNE.

Marketed by BuildAir since 2002 (www.buildair.com)

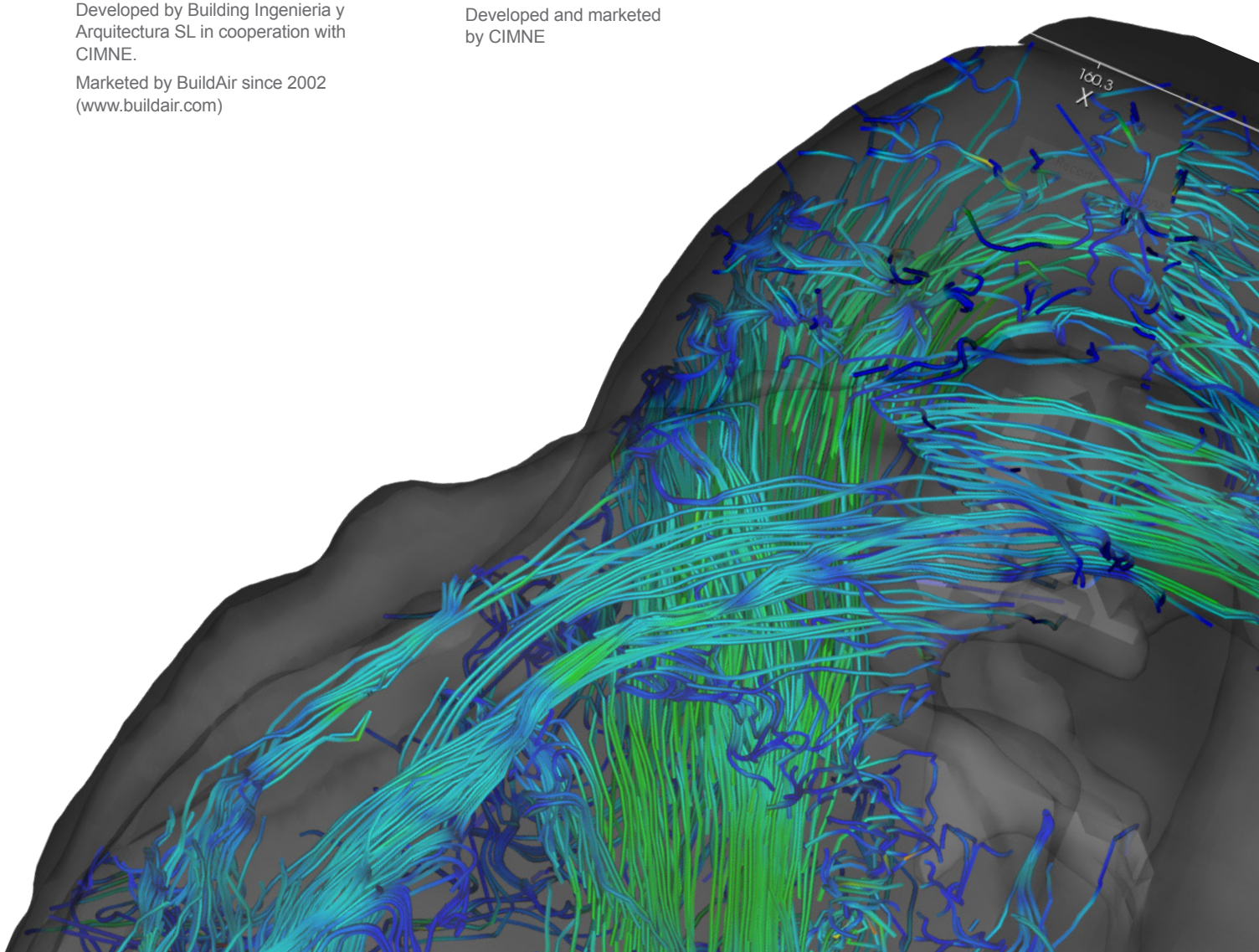
# EDUCATIONAL SOFTWARE

## SoftEducatiu



Educational software for interactive elearning on structural analysis and the finite element method

Developed and marketed by CIMNE



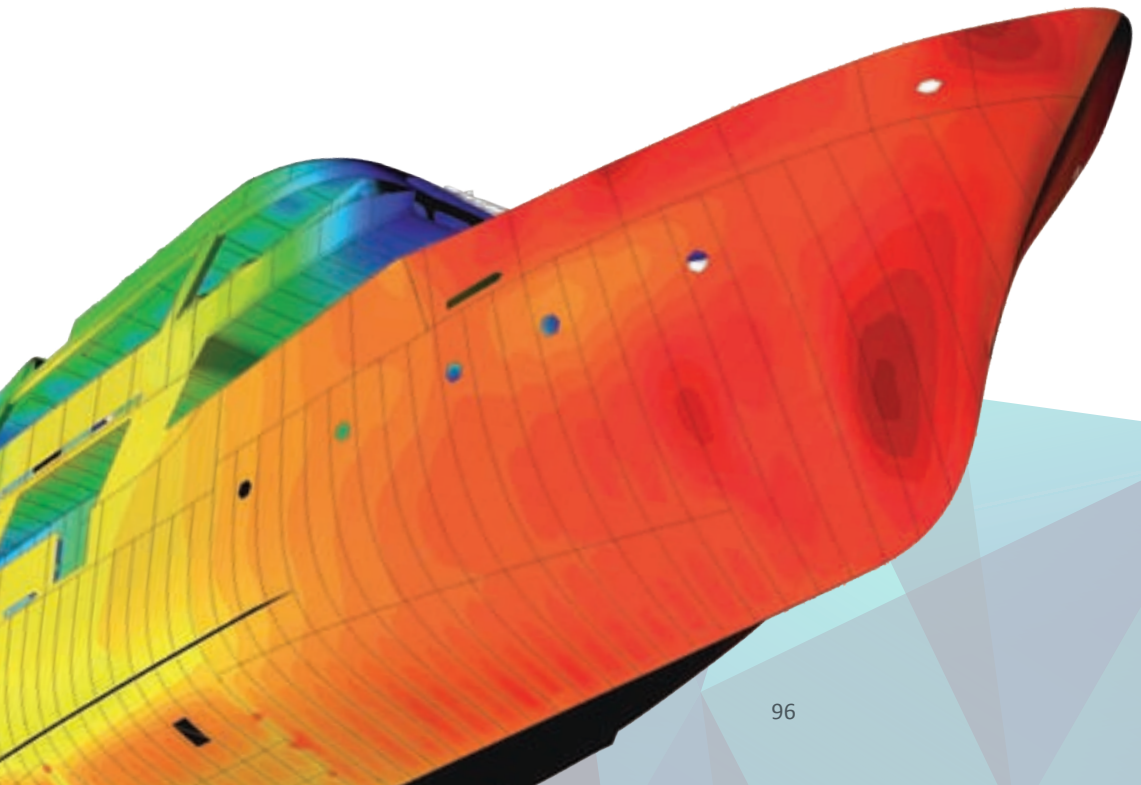
# Spin-off companies

Companies promoted by CIMNE

**INGENIA AIE** *(Created in 2004) is a Group of Economic Interest formed by 8 companies and CIMNE. The objective of INGENIA is to promote the participation of its members in projects of industrial size in the aeronautics and space fields in cooperation with the main international manufacturers in the sector. The partners in INGENIA are: Applus, Cimsa, Compass, CT Ingenieros, Prae Trade, Quantech ATZ, Rücker Lypsa, Solid Enginyeria and CIMNE. (www.ingenia.aero). CIMNE owns 12% of INGENIA AIE.*

**COMPASS INGENIERÍA Y SISTEMA S.A.** *(Created in 2002) The objective of COMPASS is to develop commercial activities in the application of numerical methods in engineering, with emphasis on civil, naval and maritime engineering. COMPASS offers design and analysis services in engineering, project management, specialized software systems for engineering design, innovative developments in engineering and advanced training courses. (www.compassis.com). CIMNE owns 24% of COMPASS.*

**STRUCTURALIA S.A.** *The objective of STRUCTURALIA is to develop training and consulting activities in civil engineering and construction sector via Internet. The company was sold in 2011 to the US company KAPLAN (The Washington Post Group).*



**CIMNE TECNOLOGIA SA** *is a company 100% owned by CIMNE aiming to industrialize and market the products and technology developed at CIMNE. CIMNE Tecnología SA is also an incubator and promoter of new companies. http://www.cimnetecnologia.com/ Created in 2011.*

**TECNOLOGÍAS AVANZADAS PARA EL OCIO SL (TAOC)** *is a company 100% owned by CIMNE Tecnologia SA. It specializes in the development and market of information systems for leisure sectors such as tourism and music. Created in 2012. (www.beaching.com)*

**SERVICIOS ENERGÉTICOS AVANZADOS SA** *is a company 100% owned by CIMNE Tecnología SA. It specializes in the development and marketing of services of software products for energy management of public and private buildings in urban areas. Created in 2012.*

**BUILDAIR INGENIERIA Y ARQUITECTURA SA** *is a company created in 2002. It specializes in the development and marketing of inflatable structures for a wide range of applications in engineering and architecture. CIMNE Tecnología SA owns 5% of BUILDAIR (www.buildair.com).*

**COMPUTATIONAL AND INFORMATION TECHNOLOGIES SA** *is a company 100% owned by CIMNE Tecnología SA. It specializes in the development and application of computational methods and information technology systems in engineering and applied sciences. Created in 2012.*

**LYNCOS SL** *is a company specialized in the development, application and marketing of information and communication technologies and devices for a wide range of application in the Internet of Things sector. CIMNE Tecnología SA owns 15% of LYNCOS SL. Created in 2012. (www.lhings.com)*

**BUILDAIR APAC** *is a subsidiary of Build AIR operating in the Asia-Pacific region from Singapore. CIMNE Tecnología SA owns 20% of BUILDAIR APAC. Created in 2012. (www.buildair.com)*

**INERGY (CIMNE-RMS GASSÓ SL)** *was created in 2012. This company specializes in the marketing of services and products for energy management of buildings and urban areas. The company is 50% owned by CIMNE Tecnología SA. (www.inergybcn.com)*

**PORTABLE MULTIMEDIA SOLUTIONS SL (PMS)** *created in 2013 It specializes in the development and marketing of mobile pavilions incorporating multimedia technology for the leisure, sport and events sectors, among others. The company is 20% owned by CIMNE Tecnología SA.*

**FRESH WATER NATURE SL** *created in 2013. it specializes in the development of solutions for obtaining fresh water from desalinization of sea water and distillation of waste water. The company is 100% owned by CIMNE Tecnología SA.*

# CIMNE MULTIMEDIA CHANNEL

## CMC

The CIMNE Multimedia Channel was created in December 2013 with the aim of disseminating scientific, technological and cultural events organized and promoted by CIMNE.


*http://www.cimnemultimediachannel.com/*

The **CIMNE Tv Channel** broadcasts selected videos and on-line events of interest to CIMNE.


The **CIMNE Radio Channel** broadcasts interviews, cultural and educational programs and music performanced produced and/or selected by CIMNE.


# CIMNE IN THE MEDIA




Eugenio Oñate

«No tenemos medios para luchar contra la naturaleza cuando se descontrola»


El Discreto Encanto del Verano

Eivissa en el bolsillo

Los 'smartphones' y sus aplicaciones facilitan a los turistas toda la información sobre la isla


Expansión.com

Build Air hace para EADS el mayor hangar hinchable

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in Engineering

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