Marino Arroyo

Universitat Politecnica de Catalunya
Campus Nord, C2-204
Jordi Girona 1-3
Barcelona, 08034
Tel: +34 934011805 Fax: +34 934011825
E-mail: marino.arroyo@upc.edu
Web site: http://www.lacan.upc.edu/arroyo/

Education

- **Northwestern University**, Evanston, IL, USA.
  Ph.D. in Mechanical Engineering — January 2003.
- **Universitat Politecnica de Catalunya (UPC)**, Barcelona, Spain.
  B.S. and M.S. in Civil Engineering —February 1998.

Experience

- **Associate professor (Professor Agregat)** October 2007 – present
  Dept. of Applied Mathematics 3, Universitat Politecnica de Catalunya (Barcelona, Spain)
- **Invited scholar** March 2005 – May 2005
  Institute for the Mathematics and its Applications (IMA), University of Minnesota (Minneapolis, MN)
- **Assistant professor** Sept 2004 – Sept 2007
  Dept. of Applied Mathematics 3, Universitat Politecnica de Catalunya (Barcelona, Spain)
- **Postdoctoral scholar** March 2003 – August 2004
  Graduate Aeronautical Labs, California Institute of Technology (CALTECH) (Pasadena, CA)

Fellowships and awards

- **O. C. Zienkiewicz Award for Young Scientists in Computational Engineering Sciences**, awarded by the European Community on Computational Methods in Applied Sciences and Engineering (ECCOMAS) April 2010
- **Awarded an European Research Council (ERC) Starting Grant** 2009–2014
- **Icrea Academia Award** for excellence in research January 2009
- **Timoshenko Visiting Scholar, Stanford University** April 2008
- **Marie Curie International Reintegration Grant** September 2006 – August 2008
- **Programa Ramón y Cajal Research position** 2003 call, declined
- **ASME/BOEING 2003 Structures and Materials Award**
  for a paper presented at the 43rd SDM Conference in Denver, co-authored by Ted Belytschko.
- **"La Caixa" Foundation Graduate Fellowship** September 1999 – July 2001

Current research interests

- Generically, mathematical modeling and simulation in small-scale mechanics, engineering, and biophysics.

- ◇ Nonlinear computational mechanics of two-dimensional materials and structures (lipid bilayers, graphene, thin shells).
- ◇ Cellular mechanics: bilayer dynamics and motility.
- ◇ Accelerated molecular dynamics of proteins.
- ◇ Nonlinear dimensionality reduction in computational mechanics.
- ◇ Phase-field modeling and simulation.
- ◇ Maximum entropy approximation methods.

Selected publications

- D. Millan, A. Rosolen and M. Arroyo (2011), "Thin shell analysis from scattered points with maximum-entropy approximants", *International Journal for Numerical Methods in Engineering*, **85**:723–751.
- H. Shima, M. Sato, K. Iiboshi, S. Ghosh and M. Arroyo (2010), "Diverse corrugation pattern in radially shrinking carbon nanotubes", *Physical Review B*, **82**:085401.
- Q. Lu, M. Arroyo and R. Huang (2009), "Elastic bending modulus of monolayer graphene", *Journal of Physics D*, **42**:102002.
  Selected to be part of the Journal of Physics D Highlights of 2009.
  `http://herald.iop.org/highlights/m92/ljc/135510/link/3448`
- M. Arroyo and A. DeSimone (2009), "Relaxation dynamics of fluid membranes", *Physical Review E*, **79**:031915.
- I. Arias and M. Arroyo (2008), "Size-dependent nonlinear elastic scaling of multiwalled carbon nanotubes", *Physical Review Letters*, **100**, 085503.
  Cover article: `http://prl.aps.org/covers/100/8`
- M. Arroyo and I. Arias (2008), "Rippling and a phase-transforming mesoscopic model for multiwalled carbon nanotubes", *Journal of the Mechanics and Physics of Solids*, **56**, 1224-1244.
  Times cited: 15
- M. Arroyo and M. Ortiz (2006), "Local maximum-entropy approximation schemes: a seamless bridge between finite elements and meshfree methods", *International Journal for Numerical Methods in Engineering*, **65**, 2167-2202.
- M. Arroyo and T. Belytschko (2004), "Finite crystal elasticity of carbon nanotubes based on the exponential Cauchy-Born rule", *Physical Review B*, **69**, 115415.
- M. Arroyo and T. Belytschko (2004), "Finite element methods for the nonlinear mechanics of crystalline sheets and nanotubes", *International Journal for Numerical Methods in Engineering*, **59**, 419456.
- M. Arroyo and T. Belytschko (2003), "Nonlinear mechanical response and rippling of thick multi-walled carbon nanotubes", *Physical Review Letters*, **91**, 215505.
- M. Arroyo and T. Belytschko (2002), "An atomistic-based finite deformation membrane for single layer crystalline films", *Journal of the Mechanics and Physics of Solids*, **50**, 1941-1977.