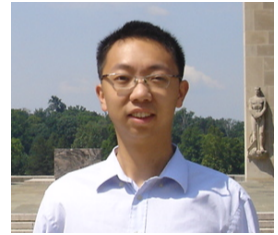# Yongxing Shen, Ph.D.

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Professional experience

Professor Lector (Assistant Professor), Applied Mathematics, Universitat Politècnica de Catalunya, April 2011 – present.

Postdoctoral Scholar, Mechanical Engineering, Stanford University, July 2008 – March 2011.

Advisor: Adrian Lew

Education

Ph.D. Materials Science and Engineering, Stanford University, September 2003 – June 2008.

Advisors: David M. Barnett, Peter M. Pinsky

Dissertation: Modeling Electrostatic Force Microscopy and Related Techniques: Forward and Inverse Problems

M.S. Mechanical Engineering, Stanford University, September 2003 – June 2006.

Depth area: Solid Mechanics

B.E. Materials Science and Engineering, Tsinghua University, Beijing, China, September 1999 – July 2003.

Grants

Marie Curie Career Integration Grant, June 2012 – May 2016, €100 000.

Acciones Integradas España-Alemania, December 2011 – December 2013, €6 000, grant for visiting a research partner, Timon Rabczuk, in Weimar, Germany.

LIST OF PUBLICATIONS

Published journal papers

M. J. Hunsweck, **Y. Shen**, and A. J. Lew. A finite element approach to the simulation of hydraulic fractures with lag. *International Journal for Numerical and Analytical Methods in Geomechanics*. Accepted for publication. DOI: 10.1002/nag.1131.

Y. Shen and A. J. Lew. A family of discontinuous Galerkin mixed methods for nearly and perfectly incompressible elasticity. *Mathematical Modelling and Numerical Analysis*. Accepted for publication **46** (2012) 1003–1028.

Y. Shen and A. Lew. Stability and convergence proofs for a discontinuous-Galerkin-based extended finite element method for fracture mechanics. *Computer Methods in Applied Mechanics and Engineering* **199** (2010) 2360–2382.

Y. Shen and A. Lew. An optimally convergent discontinuous-Galerkin-based extended finite element method for fracture mechanics. *International Journal for Numerical Methods in Engineering* **82** (2010) 716–755.

Y. Shen, D. M. Barnett, and P. M. Pinsky. Simulating and interpreting Kelvin probe force microscopy images on dielectrics with boundary integral equations. *Review of Scientific Instruments* **79** (2008) 023711.

Y. Shen, M. Lee, W. Lee, D. M. Barnett, P. M. Pinsky, and F. B. Prinz. A resolution study for electrostatic force microscopy on bimetallic samples using the boundary element method. *Nanotechnology* **19** (2008) 035710.

Y. Shen, D. M. Barnett, and P. M. Pinsky. Modeling electrostatic force microscopy for conductive and dielectric samples using the boundary element method. *Engineering Analysis with Boundary Elements* **32** (2008) 682–691.

Y. Shen, D. M. Barnett, and P. M. Pinsky. Analytic perturbation solution to the capacitance system between a hyberboloidal tip and a rough surface. *Applied Physics Letters* **92** (2008) 134105.

D. Qiu, **Y. X. Shen**, and W. Z. Zhang. An extended invariant line analysis for fcc/bcc precipitation systems. *Acta Materialia* **54** (2006) 339–347.

In-preparation manuscripts

Y. Shen. An efficient method to solve the free-surface problem in the hydraulic fracturing process with variational inequalities. In preparation.

Y. Shen and A. Lew. A locking-free discontinuous-Galerkin-based extended finite element method for stress analysis of cracked nearly incompressible materials. In preparation.

M. J. Hunsweck, **Y. Shen**, and A. Lew. A finite element approach for simulating curvilinear cracks. In preparation.

Conference proceeding

Y. Shen, D. M. Barnett, and P. M. Pinsky. Integral equation modeling of electrostatic interactions in atomic force microscopy. In C. Constanda and S. Potapenko, editors, *Integral Methods in Science and Engineering: Techniques and Applications*, pages 237–246, Boston, 2008. Birkhäuser.

Conference presentations

A robust discontinuous-Galerkin-based extended finite element method for fracture problems with nearly incompressible elasticity (**Keynote presentation**). At *eXtended Finite Element Method (XFEM) 2011*, Cardiff, Wales, United Kingdom, 29 June 2011.

–. At the *International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2011)*, Barcelona, Spain, 8 June 2011.

Simulation of hydraulic fracturing: Interaction between a cracked solid and the lubrication flow in the crack. At the *International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2011)*, Barcelona, Spain, 7 June 2011.

–. At the *American Society of Mechancial Engineers (ASME) Congress 2010*, Vancouver, British Columbia, Canada, 17 November 2010.

An optimally convergent discontinuous-Galerkin-based extended finite element method for fracture mechanics. At the *10th United States National Congress on Computational Mechanics (USNCCM)*, Columbus, Ohio, United States, 17 July 2009.

–. At the *Joint ASCE-ASME-SES Conference on Mechanics and Materials*, Blacksburg, Virginia, United States, 25 June 2009.

Determining charge distributions from Kelvin probe force microscopy images. At the *9th USNCCM*, San Francisco, California, United States, 26 July 2007.

Integral equation modeling of electrostatic interaction in atomic force microscopy. At the *9th International Conference on Integral Methods in Science and Engineering*, Niagara Falls, Ontario, Canada, 25 July 2006.

Quantitative modeling of electrostatic force microscopy. At the *Materials Research Society (MRS) Fall Meeting*, Boston, Massachusetts, United States, 1 December 2005.

Doctoral students supervised

Zhiming Guo, co-supervised with Shihai Li (Institute of Mechanics, Chinese Academy of Sciences), started on 1 March 2012

Vahid Ziaei-Rad, to start in June 2012

Teaching experience at Universitat Politècnica de Catalunya

Advanced Discretization Methods, second semester of 2011–2012

Computational Wave Propagation, second semester of 2011–2012

Computational Mechanics, first semester of 2011–2012

Computer Modelling, first semester of 2011–2012

Advanced Discretization Methods, second semester of 2010–2011

Computational Wave Propagation, second semester of 2010–2011

Professional services

Peer-reviewer for journals (number of times):

Applied Physics Letters (1)
Engineering Analysis with Boundary Elements (1)
Finite Elements in Analysis and Design (2)
International Journal for Numerical Methods in Engineering (1)

Defense committee member of:

Kuan Zhang's PhD thesis proposal, in *Applied Mathematics*, Universitat Politècnica de Catalunya, September 19, 2011

Adrián Rosolen's PhD thesis, in *Applied Mathematics*, Universitat Politècnica de Catalunya, July 11, 2011

Erasmus Mundus Masters program in *Computational Mechanics* (6 masters candidates), June 28, 2011

Language proficiency

Chinese (Cantonese and Mandarin): native

English: fluent

Spanish: fluent in reading, intermediate in listening, speaking and writing

Catalan: taking a course which leads to level A2.1 (February – May 2012)

German: coursework (256 hours) (September 1999 – June 2001)

French: coursework (128 hours) (September 2002 – June 2003)