



Professor Marino Arroyo

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Education:

- _ Northwestern University, Evanston, IL, USA. Ph.D. in Mechanical Engineering — January 2003.
- _ Universitat Politècnica 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 Politècnica 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 Politècnica 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)
- _ Awarded an European Research Council (ERC) Starting Grant
- _ Icrea Academia Award for excellence in research

- _ Timoshenko Visiting Scholar, Stanford University
- _ Marie Curie International Reintegration Grant
- _ Programa Ramón y Cajal Research position
- _ 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.