Biographical Sketch

Name and address:

Michel E. Jabbour
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Employment and Education:

- Associate Professor, Department of Mathematics, University of Kentucky, 2007–present.
- Assistant Professor, Department of Mathematics, University of Kentucky, 2001–2007.
- Postdoctoral Associate, Center for Nonlinear Analysis, Department of Mathematical Sciences, Carnegie Mellon University, 1999–2001.
- Ph.D., Applied Mechanics, California Institute of Technology, 2000.
- M.Sc., Aeronautics, California Institute of Technology, 1994.
- Maîtrise de Mécanique (Option "Modélisation et Calcul Scientifique"), Université Pierre et Marie Curie (Paris 6), 1993.
- **Research visits:**
  - Center of Advanced European Studies and Research, Bonn (Germany), November 2004 & June 2005.
  - Dipartimento di Matematica, Università di Torino, Turin (Italy), May–June 2004 and May–June 2005.
  - Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, October–November 2004.
  - Department of Mechanical Engineering, State University of New York at Stony Brook, Stony Brook, September–December 2003.

Research Interests:

Continuum mechanics and mathematical aspects of materials science, including:

- epitaxial growth and related morphological and compositional instabilities;
- evolution of micro- and nano-structures and defects, anisotropic curvature flow of grain boundaries and phase interfaces;
- diffusive and martensitic phase transitions, dynamics of phase segregation in multispecies systems.

NSF Grants and Awards:

- 06/01/2006–05/31/2009: P.I. on Grant No. DMS-0605309 from the *National Science Foundation* (Division of Mathematical Sciences, Applied Mathematics Program). Title: "Novel instabilities during the epitaxy of single- and multi-species films. A multiscale approach". Budget: $179,527.

- 07/01/2002–06/30/2005: P.I. on Grant No. DMS-0204939 from the *National Science Foundation* (Division of Mathematical Sciences, Applied Mathematics Program). Title: "Some studies on phase segregation and the influence of microstructure on multispecies thin solid film growth". Budget: $82,995.

- 07/01/2003–06/30/2004: P.I. on Grant No. DMS-0334828 from the *National Science Foundation* (Division of Mathematical Sciences, Applied Mathematics Program) [Co-P.I. C.-S. Man]. Title: "Conference on Multiscale effects in material microstructures and defects". Budget: $8,500.

Other Grants and Awards:

- 06/01/2005–05/31/2007: P.I. on Grant No. KSEF-801-RDE-007 from the *Kentucky Science and Engineering Foundation*. Title: "The role of chemistry, anisotropy, and electromigration in the epitaxial growth of multispecies crystals". Budget: $63,944.

- 05/2006–08/2006: Summer faculty research fellowship. Awarded by the *Office of the Vice President for Research at the University of Kentucky*. Budget: $8,500. Status: declined due to availability of external funding.

- Awarded $4,000 from the *Institute for Mathematics and its Applications*, $3,500 from the *Society for Natural Philosophy*, and $2,500 from the *Office of the Vice-President for Research at the University of Kentucky* in partial support for the SNP/IMA-PI conference on "Multiscale effects in material microstructures and defects", September 26–28, 2003 (Lexington, KY).

- 09/2002–06/2003: Co-P.I. on Grant from the *University of Kentucky*, under the "Research Equipment Initiative". Title: "Ultrasonic System for Electromagnetic Acoustic Resonance Spectroscopy". (P.I.: C.-S. Man, Department of Mathematics; co-P.I.'s: J.G. Morris and T. Zhai, Department of Chemical & Materials Engineering). Budget: $32,450.

- 05/2002–08/2002: Summer faculty research fellowship. Awarded by the *Office of the Vice President for Research at the University of Kentucky*. Budget: $5,000. Status: declined due to availability of external funding.

- 04/01/2002–06/30/2003: P.I. on Grant No. KSEF-148-502-02-15 from the *Kentucky Science and Engineering Foundation*. Title: "Phase segregation and the influence of microstructure on the growth of multispecies thin solid films". Budget: $14,065.

- 09/1993–06/1994: *Charles Lee Powell Foundation* Graduate Fellowship.

- 09/1989–06/1993: *Hariri Foundation* Undergraduate Scholarship.

Published Papers:

1. M. E. Jabbour & K. Bhattacharya, A multispecies step flow model of growth of compound thin films by MOCVD, *Thin Solid Films*, **357**, 1999, 26–30.

2. M. E. Gurtin & M. E. Jabbour, Interface evolution in three dimensions with curvature-dependent energy and surface diffusion: interface-controlled evolution, phase transitions, epitaxial growth of elastic films, *Arch. Rational Mech. Anal.*, **163**, 2002, 171–208.

3. M. E. Jabbour & K. Bhattacharya, Multispecies thin solid film growth by chemical vapor deposition, *J. Elasticity*, **73**, 2003, 13–74.

4. P. Cermelli & M. E. Jabbour, Multispecies epitaxial growth on vicinal surfaces with chemical reactions and diffusion, *P. Royal Soc. London A*, **461**, 2005, 3483–3504.

5. M. E. Jabbour, Epitaxy of binary compounds and alloys, *J. Elasticity*, **80**, 2006, 153–182.

6. F. Haußer, M. E. Jabbour, & A. Voigt, A Step-Flow Model for the Heteroepitaxial Growth of Strained, Substitutional, Binary Alloy Films With Phase Segregation: I. Modeling, *SIAM Multiscale Modeling & Simulation*, **6**, 2007, 158–189.

7. P. Cermelli & M. E. Jabbour, A Novel Mechanism for the Onset of Step-Bunching Instabilities During the Epitaxy of Single-Species Crystalline Films, *Phys. Rev. B*, **75**, 2007, 165409-1/165409-9.

Preprints:

8. M. E. Jabbour, On the Flow of Chemically Reacting Mixtures in Vertical Axisymmetric Chemical Vapor Deposition Reactors, preprint.

9. M. E. Jabbour & A. Voigt, The Evolution of a Sharp Interface in the Presence of Micro- and Configurational Forces. Phase Segregation During Diffusive Phase Transition, Crystal Growth, and Step-Flow Epitaxy, preprint.

Selected Conference Presentations:

- Special-session talk, American Mathematical Society Fall Central Section Meeting, Cincinnati, October 2006.
- Mini-workshop talk, Mathematisches Forschunginstitut Oberwolfach, Germany, August 2006 (declined due to travel constraints).
- Symposium talk, American Society of Mechanical Engineers International Congress, Orlando, November 2005.
- Symposium talk, 41-st Technical Meeting of the Society of Engineering Science, Lincoln, October 2004.
- Symposium talk, 14-th US National Congress of Theoretical & Applied Mechanics, Blacksburgh, July 2002.

- Symposium talk, International Conference of Theoretical & Applied Mechanics, Chicago, September 2000.
- Symposium talk, Society for Industrial & Applied Mathematics, Philadelphia, May 2000.
- Symposium talk, Materials Research Society, Boston, November 1998.

Selected Seminar and Colloquium Talks:

- Seminar talk, Department of Mathematics, Purdue University, March 2007.
- Seminar talk, Department of Mechanical & Aerospace Engineering, Washington University, St. Louis, October 2006.
- Seminar talk, Crystal Growth Group, Center of Advanced European Studies and Research, Bonn, June 2005.
- Seminar talk, Department of Mathematics, University of Bonn, Bonn, November 2004.
- Seminar talk, Crystal Growth Group, Center of Advanced European Studies and Research, Bonn, November 2004.
- Seminar talk, Department of Aerospace engineering & Mechanics, University of Minnesota, Minneapolis, April 2003.
- Colloquium talk, Department of Mathematics, Kent State University, Kent, April 2002.
- Seminar talk, Department of Civil Engineering, Università di Roma "Tor Vergata", Rome, August 2001.
- Colloquium talk, Department of Mathematical Sciences, Stevens Institute of Technology, Hoboken, May 2001.
- Colloquium talk, Department of Mathematics, University of Kentucky, Lexington, April 2001.
- Seminar talk, Center for Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, March 2001.
- Seminar talk, Center for Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, October 1999.
- Mini-workshop talk, "Modeling and Simulation of Advanced Materials Processes: Virtual Integrated Prototyping Initiative for Thin Films", Courant Institute, New York University, September 1998.

Professional Activities:

- Referee for the *Journal of Elasticity*, *Mathematics and Mechanics of Solids*, *Physical Review E*, *SIAM Journal on Applied Mathematics*, and *Continuum Mechanics & Thermodynamics*.
- Reviewer for *Mathematical Reviews*.
- Co-organizer (with C.-S. Man) of the SNP/IMA-PI conference on "Multi-scale effects in material microstructures and defects", September 26–28, 2003 (Lexington, KY).
- Served on the "Mathematics of Materials and Mechanics" panel of the National Science Foundation (Division of Mathematical Sciences) in 2004.
- Served on the "Nanoscale Interdisciplinary Research Teams" panel of the National Science Foundation (Division of Engineering) in 2005.
- Served on the "Mathematics of Materials and Mechanics" panel of the National Science Foundation (Division of Mathematical Sciences) in 2007.

Advisors:

- Thesis Advisor: K. Bhattacharya (Caltech).
- Postdoctoral Mentor: M. E. Gurtin (CMU).

Mentoring Activities:

1. Ph.D. advisor to N. Kirby, University of Kentucky, August 2005–present.
2. Undergraduate advisor to E. Prato, University of Kentucky and Università di Torino, July–August 2004.

Collaborators:

- Kaushik Bhattacharya, Division of Engineering and Applied Science, California Insitute of Technology.
- Paolo Cermelli, Dipartimento di Matematica, Università di Torino.
- E. Fried, Department of Mechanical and Aerospace Engineering, Washington University in St. Louis.
- Morton E. Gurtin, Department of Mathematical Sciences, Carnegie Mellon University.
- Frank Haußer, Crystal Growth Group, Center of Advanced European Studies and Research.
- Robert Kukta, Department of Mechanical Engineering, State University of New York at Stony Brook.
- Chi-Sing Man, Department of Mathematics, University of Kentucky.
- Axel Voigt, Crystal Growth Group, Center of Advanced European Studies and Research.