

Faisal Amlani - CV

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Born July 19, 1984 in Toronto, Canada and raised in USA

Native fluency in English, working proficiency in French

French Qualification Section 26

Education

- 2013 PhD in applied math, California Institute of Technology (Caltech), USA
Advised by Professor OSCAR P. BRUNO (applied math): "A new high-order Fourier Continuation-based elasticity solver for complex three-dimensional geometries".
Jury of Professors GUILLAUME BLANQUART (mechanics), DANIEL MEIRON (aero-nautics, applied math) and HOUMAN OWHADI (applied math, dynamical systems).
Took classes in real, complex and functional analysis; theory, numerics in dynamical systems, PDEs and linear algebra; probability, statistics and optimization.
- 2006 BA with highest honors (*summa cum laude*) in applied math, Rice University, USA
Research projects advised by Professors STEVE COX (applied math), MATTHIAS HEINKENSCHLOSS (applied math) and ALEX RIMBERG (physics).
Took classes in pure and applied math; theory, laboratory in physics and chemistry.

Research experience

- 2016- POems at the École Nationale Supérieure de Techniques Avancées, France
Postdoctoral research with Dr. STÉPHANIE CHAILLAT and Dr. ADRIEN LOSEILLE on anisotropic refinement for BEMs applied to wave propagation in acoustics, solids.
- 2015-2016 REO group at Sorbonne Universités INRIA-Paris, LJLL - Paris VI (UPMC), France
Postdoctoral research with Dr. MIGUEL FERNÁNDEZ on fracture of thin structures in fluids with biomedical applications to cell rupture and drug delivery in blood flow.
- 2013-2015 Stabilis Inc. (now Aeromana Inc.), USA
Co-founder and *CTO, experimentalist, electrical/controls scientist* in an R&D startup company for novel methods of active aerodynamic flow control.
- 2014 Department of Computing & Mathematical Sciences at Caltech, USA
Research Scientist (part-time) modeling waveguides for non-destructive testing; col-laboration with Prof J.C. LÓPEZ-VÁZQUEZ (physics at Universidade de Vigo, Spain).
- 2007-2013 Department of Applied & Computational Mathematics at Caltech, USA
Doctoral research on a high-performance spectral method for 3D time-domain elastic wave propagation applied to seismology (earthquakes) and materials (guided waves).
Independent collaboration in FSI modeling of arterial networks with Prof NIEMA PAHLEVAN (heart scientist at the University of Southern California, USA).
- Sum 2005 Simulation-Driven Optimization Group at Rice University, USA
NSF fellowship with Prof MATTHIAS HEINKENSCHLOSS on optimal sensor placement for time reconstructions of the 2D advection-diffusion equation for gaseous flow.

Sum 2004 LLNL group at Institute for Pure & Applied Mathematics (IPAM-UCLA), USA
RIPS fellowship (one of 28 international) on flux-correction methods for the Boltzmann equation in biohazard detection with Lawrence Livermore National Labs.

2003-2004 Rimberg lab in Physics & Astronomy at Rice University, USA
Paid research assistantship with Prof ALEX RIMBERG (now at Dartmouth College) on methods for optimal design of impedance circuits for single electron transistors.

Teaching experience

2007-2013 Complex variables, ordinary and partial differential equations at Caltech, USA
Managing (head) assistant for a mandatory course sequence with Professors OSCAR BRUNO, THOMAS HOU, DAN MEIRON, HOUMAN OWHADI, NILES PIERCE.
Delivering lectures to the main class (~200 students); designing curricula and writing problems, solutions, handouts for all (10) sections; managing teaching assistants.

2005 Theoretical neuroscience at Rice University and Baylor College of Medicine, USA
Exercises and labs for grad-level mathematical neuroscience with Prof STEVE COX.

2004, 2005 Differential equations in science and engineering at Rice University, USA
Exercises for third-year analysis of ODEs/PDEs in diffusion and wave propagation with Professors LILIANA BORCEA, E. MCKAY HYDE, DMITRIY LEYKEKHMAN.

Awards and fellowships

2014 W.P. Carey Prize (department-wide) for "most outstanding doctoral dissertation in pure mathematics or applied mathematics" from Caltech, USA

2014 Demetriades-Tsafka-Kokkalis Prize (university-wide) for "best thesis, publication or discovery" in seismology/seismo-engineering from Caltech, USA

2011 Distinction in Teaching (department-wide) in applied math from Caltech, USA

2006-2007 Gordon & Betty Moore Fellowship (university-wide) from Caltech, USA

2002-2006 Trustee Distinguished Scholarship (university-wide) from Rice University, USA

2005 REU Research Fellowship from the National Science Foundation, USA

2004 RIPS Research Fellowship at the Institute for Pure & Applied Mathematics, USA

2004 Tom Bonner Book Prize (university-wide) for "most outstanding student in physics" from Rice University, USA

Papers and patents

2018b AMLANI, CHAILLAT and LOSEILLE, "Anisotropic mesh adaptation for high-order BEMs", in preparation.

2018a AMLANI and PAHLEVAN, "FC for arterial wave dynamics", in preparation.

2016 AMLANI and BRUNO, "An FC-based spectral solver for elastodynamic problems in general three-dimensional domains", *J Comput Phys* 307.

2015 AMLANI, MILLER and LOMBARDINI, "Dynamically controllable force generating device", *U.S./International Patent Pending US20160327073/WO2016179405.*

2011 PAHLEVAN, AMLANI et al., "A physiologically relevant, simple outflow boundary model for truncated vasculature", *Ann Bio Eng* 39,5.

2010 LÓPEZ-VÁZQUEZ, AMLANI et al., "Numerical modeling and measurement by pulsed television holography of ultrasonic displacement maps in plates with through-thickness defects", *Opt Eng* 49,9.

2009 LÓPEZ-VÁZQUEZ, AMLANI et al., "Modeling for characterizing defects in plates using two-dimensional maps of instantaneous ultrasonic out-of-plane displacement obtained by pulsed TV-holography", *SPIE* 7389.

Invited talks and conference presentations

TALKS ON ANISOTROPIC MESH ADAPTATION FOR 3D BEMs

- 2017e Invited at *JJC Ondes (journées jeunes chercheurs)*, Paris VI (UPMC), France
- 2017d Contributed at the *Paris-London BEM Workshop*, University College London, UK
- 2017c Contributed at the *5th BEM on the Saar*, Universität des Saarlandes, Germany
- 2017b Contributed at *WAVES 2017*, University of Minnesota, USA

TALKS ON FOURIER CONTINUATION METHODS FOR 3D ELASTODYNAMICS

- 2017a Contributed at *WAVES 2017*, University of Minnesota, USA
- 2015b Invited seminar in seismology, Institut de Physique du Globe de Paris (IPGP), France

TALKS ON OTHER TOPICS

- 2015a Invited lecture on delay differential equations for clinical applications in respiratory physiology, Department of Medical Engineering at Caltech, USA
- 2006 Contributed on optimized sensor location for 2D advection-diffusion equations using proper orthogonal decompositions, *NSF-VIGRE Symposium*, Rice University, USA
- 2004 Invited joint talk on flux corrections for the Boltzmann equation, Center for Applied Scientific Computing at Lawrence Livermore National Laboratory, USA

Professional

ACTIVITIES, COMMITTEES AND MEMBERSHIPS

- 2012-2013 *Committee* for inviting and hosting speakers for weekly seminars at Caltech
 - 2012,2013 *Admissions review of applications* to applied math graduate programs at Caltech
 - 2005-2006 *Secretary* and *Undergrad Representative* for Rice SIAM Graduate Student Chapter
- Member of the *American Mathematical Society (AMS)*, the *Society for Industrial & Applied Mathematics (SIAM)*, *Phi Beta Kappa* and *Tau Beta Pi*.

TECHNICAL LANGUAGES

C/C++, Fortran, Python, Arduino Microcontroller, MATLAB, Mathematica, HPC for GPU and CPU (MPI, OpenMP)

References

Dr. OSCAR P. BRUNO, *Professor of Applied & Computational Mathematics (ACM)*
California Institute of Technology | +1 (626) 395-4548 | obruno@caltech.edu

Dr. STÉPHANIE CHAILLAT, *CNRS Chargée de Recherche*
ENSTA-ParisTech | +33 1 81 87 20 83 | stephanie.chaillat@ensta-paristech.fr

Dr. STEVEN COX, *Emeritus Professor of Computational & Applied Mathematics*
Rice University | +1 (505) 747-5424 | steve.cox@nmmc.edu

Dr. ADRIEN LOSEILLE, *Chargé de Recherche*
INRIA-Saclay | +33 1 77 57 80 15 | adrien.loseille@inria.fr

Dr. DAN MEIRON, *Fletcher Jones Professor of Aeronautics and ACM*
California Institute of Technology | +1 (626) 395-4563 | dim@caltech.edu

Dr. NIEMA PAHLEVAN, *Assistant Professor of Mechanical Engineering and Medicine*
University of Southern California | +1 (213) 740-7182 | pahlevan@usc.edu