Mohammad Motamed

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Visa Status: Permanenet resident of the United States

EDUCATION

- 2008 PhD Numerical Analysis KTH Royal Institute of Technology, Sweden
  Advisors: Prof. Olof Runborg and Prof. Heinz-Otto Kreiss
  Dissertation: Topics in analysis and computation of linear wave propagation
- 2003 MSc Scientific Computing KTH Royal Institute of Technology, Sweden
  Advisor: Prof. Gunilla Kreiss
  Thesis title: PML methods for aero acoustics computations
- 2000 MSc Structural Engineering Amirkabir University of Technology, Iran
  Advisor: Prof. Alireza Rahai
  Thesis title: Computation of shear stresses in prestressed concrete bridges
- 1998 BSc Civil Engineering Persian Gulf University, Iran

EMPLOYMENT

- 2009- Postdoctoral fellow, King Abdullah University of Science and Tech., Saudi Arabia
  Visiting researcher at ICES, The University of Texas at Austin, USA
- 2008-2009 Postdoctoral fellow, Mathematics Department, Simon Fraser University, Canada
- 2002-2008 Graduate research and teaching assistant, KTH Royal Institute of Technology, Sweden

GRANTS

- Lars Hiertas Foundation's Scholarship for a long-term program on Multiscale Problems, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, 2007
- Albert Einstein Institute Research Grant in Numerical Relativity, Potsdam, Germany, 2006
- NSF/IPAM Grant for a long-term program on Multiscale Problems, University of California at Los Angeles, USA, 2005
- NordForsk Grant for the Winter School in Computational Mathematics, Norway, 2004

RESEARCH INTERESTS

- Numerical Analysis and Scientific Computing
  - ∗ Deterministic and stochastic partial differential equations
  - ∗ Multiscale problems
  - ∗ High frequency wave propagation problems
- Computational Science and Engineering
  - ∗ Geosciences, fluid and solid mechanics, general relativity, aeroacoustics, biomedical engineering, electromagnetics, and materials science

PUBLICATIONS

I. Refereed Journals

1 M. Motamed and O. Runborg. A Wavefront-Based Gaussian Beam Method for Computing High Frequency Waves. Submitted to *Journal of Computational Physics*, 2012.

2 M. Motamed and F. Nobile and R. Tempone. Analysis and Computation of the Elastic Wave Equation with Random Data. Submitted to *IMA Journal in Numerical Analysis*, 2012.

3 M. Motamed and F. Nobile and R. Tempone. A Stochastic Collocation Method for the Second Order Wave Equation with a Discontinuous Random Speed. Accepted in *Numerische Mathematik*, Published online: 31 August 2012. `http://www.springerlink.com/content/2587862j42564197/`

4 M. Motamed and C. B. Macdonald and S. J. Ruuth. On the Linear Stability of the Fifth-Order WENO Discretization. *Journal of Scientific Computing*, vol. 47, no. 2, pp. 127-149, 2011. `http://link.springer.com/article/10.1007/s10915-010-9423-9`

5 M. Motamed and O. Runborg. Taylor Expansion and Discretization Errors in Gaussian Beam Superposition. *Wave Motion*, vol. 47, no. 7, pp. 421-439, 2010. `http://www.sciencedirect.com/science/article/pii/S0165212510000247`

6 M. Motamed and O. Runborg. A Multiple-Patch Phase Space Method for Computing Trajectories on Manifolds with Applications to Wave Propagation Problems. *Communications in Mathematical Sciences*, vol. 5, no. 3, pp. 617-648, 2007. `http://www.nada.kth.se/~mohamad/CR2_CMS.pdf`

7 M. Motamed and O. Runborg. A Fast Phase Space Method for Computing Creeping Rays. *Journal of Computational Physics*, vol. 219, issue 1, pp. 276-295, 2006. `http://www.sciencedirect.com/science/article/pii/S0021999106001653`

8 M. Motamed, M. Babiuc, B. Szilagyi, H-O. Kreiss, and J. Winicour. Finite Difference Schemes for Second Order Systems Describing Black Holes. *Journal of Physical Review D*, vol. 73, issue 12, 2006. `http://www.nada.kth.se/~mohamad/paper_excision_PRD.pdf`

II. Papers in Preparation

9 M. Motamed and H.-O. Kreiss. Boundary Stability of Initial-Boundary Value Problems for First Order Systems of Hyperbolic Equations. Preprint 2012.(*to be submitted*)

10 I. Babuška and R. Lipton and M. Motamed and R. Tempone. A stochastic multiscale method for the elastodynamic wave equations arising from fiber composites.

11 R. Lipton and M. Motamed and R. Tempone. An L^2-global to local projection method for multiscale hyperbolic problems.

12 R. Lipton and M. Motamed and R. Tempone. An L^2-global to local projection method for multiscale parabolic problems.

13 M. Motamed and O. Runborg and R. Tempone. Gaussian beam summation for high-frequency wave propagation in random media.

III. Conference Proceedings, Theses, Chapters in Books

14 M. Motamed and O. Runborg. Asymptotic Approximations of High Frequency Wave Propagation Problems. In *Highly Oscillatory Problems*, volume 366 of London Mathematical Society Lecture Note Series, Cambridge University Press, pp. 72-97, 2009.

15 M. Motamed. Topics in Analysis and Computation of Linear Wave Propagation. *Doctoral Thesis*. School of Computer Science and Communication, KTH Royal Institute of Technology, Stockholm, Sweden, 2008. ISBN 978-91-7178-961-7. `http://www.nada.kth.se/~mohamad/PHDthesis_Motamed.pdf`

16 M. Motamed and O. Runborg. Solution of High-Frequency Wave Propagation Problems by a Fast Multiple-Patch Phase Space Method. *In Proceedings of WAVES 2007*, University of Reading, UK, 2007.

17 M. Motamed and O. Runborg. A Wavefront Gaussian Beam Method for High-Frequency Wave Propagation. *In Proceedings of WAVES 2007*, University of Reading, UK, 2007.

18 M. Motamed. Phase Space Methods for Computing Creeping Rays. *Licentiate's Thesis*. School of Computer Science and Communication, KTH Royal Institute of Technology, Stockholm, Sweden, 2006. ISBN 91-7178-467-5.

19 M. Motamed and O. Runborg. A Fast Method for the Creeping Ray Contribution to Scattering Problems. *In Proceedings of 2nd Conference on Mathematical Modeling of Wave Phenomena*, Växjö, Sweden, AIP Conference Proceedings, pp. 56-64, 2005.

20 M. Motamed. PML Methods for Aero Acoustics Computations. *Master's Thesis*. Department of Numerical Analysis and Computer Science, KTH Royal Institute of Technology, Stockholm, Sweden, 2003. TRITA-NA-E03108.

CONFERENCES AND TALKS

1. SIAM Conference on Computational Science and Engineering, Boston, Massachusetts, USA, February 25-March 1, 2013 (invited speaker).

2. Applied Analysis Seminar at the Department of Mathematics, Louisiana State University, USA, August 14, 2012 (invited by Prof. Robert Lipton to give a talk).

3. Seminar at Mathematics Institute of Computational Sciences and Engineering, EPF Lausanne, Switzerland, July 17, 2012 (invited by Prof. Fabio Nobile to give a talk).

4. International Conference on Spectral and High Order Methods (ICOSAHOM 2012), Gammarth, Tunisia, June 25-29, 2012 (invited speaker).

5. Seminar at Bureau of Economic Geology, Department of Geological Sciences, University of Texas at Austin, USA, April 27, 2012 (invited by Prof. Sergey Fomel to give a talk).

6. SIAM Conference on Uncertainty Quantification, Raleigh, North Carolina, USA, April 2-5, 2012 (invited speaker).

7. A three-day workshop on "advanced techniques for active learning in science and engineering graduate classrooms", King Abdullah University of Science and Technology, Saudi Arabia, 2012 (attendant).

8. 11th US National Congress on Computational Mechanics, University of Minnesota, USA, July 25-28, 2011 (invited speaker).

9. The ACMAC Workshop on Stochastic Partial Differential Equations, University of Crete, Heraklion, Crete, Greece, June 13-17, 2011 (invited speaker).

10. 3rd International Conference on Computational Methods in Structural Dynamics & Earthquake Engineering, Corfu, Greece, May 25-28, 2011 (speaker).

11. International Conference in Celebration of Heinz-Otto Kreiss's 80th Birthday, KTH, Stockholm, Sweden, Sept 13, 2010 (attendant).

12. Sparse Tensor Discretizations of High-Dimensional Problems, Zurich Summer School, ETH, Zurich, Switzerland, August 23-27, 2010 (attendant).

13. Numerical Solution of Stochastic Partial Differential Equations, Politecnico di Torino, Italy, May 10-13, 2010 (attendant).

14. ENUMATH conference, Uppsala, Sweden, June 29-July 03, 2009 (speaker).

15. A three-day workshop on "instructional skills", Simon Fraser University, Canada, 2008 (attendant).

16. SCAIM Seminar, University of British Columbia, Canada, November 25, 2008 (invited speaker).

17. CSC Seminar, Simon Fraser University, Canada, October 24, 2008 (invited speaker).

18. 7th Pacific Northwest PDE Meeting, University of Victoria, BC, Canada, September 27, 2008 (attendant).

19. Geometry and Analysis, Royal Institute of Technology, Stockholm, Sweden, August 25-29, 2008 (attendant).

20. SIAM Conference on Analysis of Partial Differential Equations, Mesa, Arizona, USA, December 10-12, 2007 (speaker).

21. Gaussian Beams with Applications in Seismology, ICES, The University of Texas at Austin, USA, November 29-December 01, 2007 (invited speaker).

22. Computational Science and Engineering Center (KCSE) Seminar, KTH, Stockholm, Sweden, October 10, 2007 (invited speaker).

23. Multiscale Modeling and Simulation in Science, Summer School, Bosön, Stockholm, Sweden, June 04-15, 2007 (attendant).

24. The Future of Computational Acoustics, Arup Acoustics, London, UK, 22-23 February, 2007 (attendant).

25. Numerical Analysis (NA) Seminar, KTH, Sweden, October 04, 2006 (invited speaker).

26. BIT Numerical Mathematics Circus, Lidingö, Stockholm, Sweden, August 31-September 1, 2006 (speaker).

27. Mathematical Problems in Numerical Relativity, University of Tüebingen, Germany, February 21-23, 2006 (attendant).

28. Multiscale Modeling and Computation - Basic Theory and the Geosciences, California Institute of Technology, USA, November 17-18, 2005 (attendant).

29. High Frequency Wave Propagation, CSCAMM, University of Maryland, College Park, USA, September 19-22, 2005 (attendant).

30. Second Order Hyperbolic Systems in Numerical Relativity, Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA, USA, September 23-24, 2005 (attendant).

31. 2nd Conference on Mathematical Modeling of Wave Phenomena, Växjö University, Sweden, August 14-19, 2005 (speaker).

32. Non-uniqueness in MHD shocks, Nordic Institute of Theoretical Physics (NORDITA), Denmark, June 20-21, 2005 (attendant).

33. Computational Problems in Physics, CPIP, Helsinki, Finland, May 23-27, 2005 (attendant).

34. Ray Hybridization Methods and Tools, INRIA, Paris, France, September 30-October 01, 2004 (attendant).

35. Adaptive methods for partial differential equations , Fourth Winter School in Computational Mathematics, Geilo, Norway, March 7-12, 2004 (attendant).

36. Multiscale Methods in Science and Engineering , Uppsala university, Sweden, January 26-28, 2004 (attendant).

LONG-TERM VISITS

- ICES, The University of Texas at Austin, 2010 - present (up to 6 months / year). Projects dealing with uncertainty quantification.
- MOX, Department of Mathematics, Politecnico di Milano, Italy, 01 June - 30 June, 2011 (1 months). Project: Elastic Wave Equation with Random Coefficients.
- MOX, Department of Mathematics, Politecnico di Milano, Italy, 27 April - 08 June, 2010 (2 months). Project: Second Order Wave Equation with Random Coefficients.
- Isaac Newton Institute for Mathematical Sciences, Cambridge University, UK, February 01-April 01, 2007 (2 months). Program: Highly Oscillatory Problems: Computation, Theory and Application.
- Albert Einstein Institute, Potsdam, Germany, January 01-30, 2006 (1 month). Project: Second Order Hyperbolic Systems in Numerical Relativity.
- IPAM, University of California, Los Angeles, September 12-December 16, 2005 (3 months). Program: Bridging Time and Length Scales in Materials Science and Bio-Physics.

COLABORATIONS

- Ivo Babuška (ICES, University of Texas at Austin, USA)
- Heinz-Otto Kreiss (KTH Royal Institute of Technology, Sweden)
- Robert Lipton (Louisiana State University, USA)
- Colin Mcdonald (University of Oxford, UK)
- Fabio Nobile (EPFL, Switzerland and Politecnico di Milano, Italy)
- Olof Runborg (KTH Royal Institute of Technology, Sweden)
- Steven Ruuth (Simon Fraser University, Canada)
- Raul Tempone (King Abdullah University of Science and Technology, Saudi Arabia)

REFEREE ACTIVITIES

- SIAM Journal on Numerical Analysis (1 assignment / year)
- Communications in Mathematical Sciences (1 assignment / year)
- International Journal for Numerical Methods in Engineering (1 assignment / year)

TEACHING EXPERIENCE

- At KTH Royal Institute of Technology (2002-2008): teaching assistant for the following undergraduate and graduate courses in Numerical Analysis. Responsibility: holding seminars, office hours, assisting students with computer lab exercises and grading homework and exams.

  1. Numerical Treatment of Differential Equations, I (graduate course)
  2. Numerical Treatment of Differential Equations, II (graduate course)
  3. Mathematical Models, Analysis and Simulation (graduate course)
  4. Numerical Linear Algebra (graduate course)
  5. Numerical Methods and programming (undergraduate course)
  6. Applied Numerical Methods, II (undergraduate course)

- At Simon Fraser University (2009): teaching a large Calculus course, Math-151, with more than 100 students in Spring 2009 in the Department of Mathematics. Responsibility: preparing notes, holding lectures and office hours three times a week, coordinating six teaching assistants, conducting mathematical labs, designing and grading homework and exams, and assigning final grades. The course evaluation indicates that 63% of 38 respondents rated my teaching ability as A or B.

- At King Abdullah University of Science and Technology (2010-2012): organizing and giving a tutorial course on "computational high frequency wave propagation" and a series of lectures on the book "Non-homogeneous boundary value problems and applications" by J. L. Lions and E. Magenes.

REFERENCES

- Tom Archibald (regarding teaching)
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  8888 University Drive, Burnaby, BC V5A 1S6, Canada
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- Shi Jin
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  Madison, WI 53706
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- Heinz-Otto Kreiss
  Department of Numerical Analysis, KTH
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  E-mail: hokreiss@nada.kth.se

- Robert Lipton
  Department of Mathematics, Louisiana State University
  384 Lockett Hall, Baton Rouge, LA 70803-4918
  Phone: (225) 578 - 1569
  E-mail: lipton@math.lsu.edu

- Fabio Nobile
  CSQI-MATHICSE, Ecole Polytechnique Federale de Lausanne (EPFL)
  Station 8, CH-1015 Laussane, Switzerland
  Phone: (41) 21 693 5411
  E-mail: fabio.nobile@epfl.ch

- Axel Ruhe (regarding teaching)
  Department of Mathematics, KTH
  Phone: (46) 8 605 4092
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- Olof Runborg
  Department of Mathematics, KTH
  S-10044 Stockholm, Sweden
  Phone: (46) 8 790 6910
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- Steven J. Ruuth
  Department of Mathematics, Simon Fraser University
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- Yen-Hsi Richard Tsai
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