

Curriculum vitae

Personal data

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Education

December 2013, HDR (Habilitation à Diriger des Recherches)
Université Paris-Sud, Orsay, France
Topic : Modélisation et simulation de la diffusion

September 2000, Ph.D. in Applied Mathematics
Massachusetts Institute of Technology, Cambridge, MA, USA
Thesis topic: Efficient model reduction of large linear systems.
Thesis supervisor: Prof. Jacob White (Research Laboratory of Electronics, MIT).

May 1995, Bachelor of Science in Honors Mathematics
University of Michigan, Ann Arbor, MI, USA
With Highest Distinction

Employment

November 2003– present, Research Scientist
Institut National de Recherche en Informatique et en Automatique (INRIA)
INRIA-Saclay, France

September 2000 – September 2003, Post-Doctoral Researcher
Courant Institute of Mathematical Sciences, New York, NY, USA

Research Experience

July 2010 – present, member of Equipe DEFI, INRIA-Saclay, France
Oct 2008 – present, external collaborator at Neurospin, Saclay, France
Modeling and simulation of diffusion MRI in biological tissue

November 2003 – June 2010, member of Equipe POEMS, INRIA-Rocquencourt, France
Time-stepping schemes for evaluating fractional integrals and derivatives.
Artificial boundary conditions for periodic waveguides with local perturbations.
Simulation of dendritic solidification using the phase field model.

September 2000 – September 2003, Courant Institute of Mathematical Sciences, New York, USA
Efficient numerical solution of the diffusion equation
Explicit time-stepping schemes for the wave equation in complex geometry
Artificial boundary conditions for the wave equation.

September 1996 – August 2000, Research Lab. of Electronics, MIT, Massachusetts, USA
Numerical linear algebra
Reduced models for on-chip interconnect modeling

Teaching

Ecole Nationale Supérieure de Techniques Avancées, Ecole des Mines, New York University,
Massachusetts Institute of Technology.

Graduate level supervision

- Ph.D. of Khieu Van Nguyen (Feb 2014 – April 2017). Topic: *Modeling, simulation and experimental verification of water diffusion in neuronal network of the Aplysia ganglia*. Co-advisor: Luisa Ciobanu.
- Ph.D. of Simona Schiavi (Sept 2013 – Dec 2016). Topic: *Homogenized models for diffusion MRI*. Co-advisor: Housseem Haddar.
- Ph.D. of Gabrielle Fournet (Nov 2013 – Nov 2016). Topic: *Computational imaging of the aging cerebral microvasculature*. Co-advisor: Luisa Ciobanu.
- Ph.D. of Hang Tuan Nguyen (Oct 2010 – Jan 2014). Topic: *Tissue parameters estimation for dMRI signals in biological tissue*. Co-advisors: Cyril Poupon and Denis Grebenkov.
- Ph.D. of Dang Van Nguyen (Oct 2010 – Jan 2014). Topic: *Efficient finite elements code for the simulation of dMRI signals in complex geometry*. Co-advisor: Denis Grebenkov.
- Post-doc of Julien Coatleven (Mar 2012-Aug 2012). Topic: *Asymptotic models for multiple compartments diffusion using mathematical homogenization*. Co-supervisor: Housseem Haddar.
- Post-doc of Fabien Caubet (Jan 2013-Aug 2013). Topic: *New transmission condition accounting for diffusion anisotropy in thin layers applied to diffusion MRI*. Co-supervisor: Housseem Haddar.
- Post-PhD study of Imen Mekkaoui (Feb 2017 – June 2017). Topic: *Quantification of cardiac motion and strain effects on the diffusion MRI signal*. Collaborators: Jan Hesthaven (EPFL), Jerome Pousin (Université de Lyon, INSA de Lyon).
- Numerous master level internships.

Grants

- Coordinator of the project *Simulation of diffusion MRI signals in biological tissue*, funded by Agence Nationale de la Recherche (French National Research Agency) in the program COSINUS 2010. Partners: INRIA (200K euros) and Neurospin (200K euros). Duration: Nov 2010-Jan 2014.
- Partner coordinator of the project *Computational imaging of the aging cerebral microvasculature*, funded by Agence Nationale de la Recherche in the program US-French Collaboration. Partners: INRIA (132K euros) and Neurospin (160K euros) and Univ of Illinois Dept of Bio-Engineering. Duration: Sept 2013-Feb 2017.

Service to the community

- Member of the SIAM Committee on Programs and Conferences, 2017-present.
- Member of INRIA *Comité Parité et Egalité*, 2016-present.
- Member of INRIA *Commission d'Evaluation*, 2015-present.
- Evaluator for European Commission Horizon 2020 call FET-OPEN - *Novel ideas for radically new technologies*, 2015.
- Associate editor of Society for Industrial and Applied Mathematics (SIAM) Journal on Scientific Computing, 2010-2015.
- Editor of special issue of Journal of Computational and Applied Mathematics for the International Conference on Mathematical and Numerical Aspects of Waves (WAVES), 2007.

Organization

- Organizer of the Summer School for Chinese students in mathematics and computer science (*Ecole d'Été France Excellence*), financed by the French Embassy in China, Palaiseau, France, 2017.

- Member of Organizing Committee of *SIAM Conference on Computational Science and Engineering*, 2017.
- Member of Scientific Committee of Conference *Analysis, probability, from theory to industrial applications: ten years of the french-vietnamese master in applied mathematics*, 2016.
- Organizer of mini-symposium *New Developments in time-stepping strategies for diffusive-type differential equations*, SIAM Conference on Computational Science and Engineering, 2017
- Organizer of mini-symposium *Physics and mathematics of diffusion magnetic resonance imaging*, SMAI (French Applied Math Society) Annual Meeting 2015.
- Organizer of mini-symposium *Simulation and modeling applied to diffusion magnetic resonance imaging*, SIAM Conference on Computational Science and Engineering, 2013
- Organizer of mini-symposium *Advances in applied numerical methods for complex applications*, International Congress on Industrial and Applied Mathematics (ICIAM), 2011.
- Member of organizing committee of WAVES 2007.

Prizes and Awards

- Article Low rank solution of Lyapunov equations chosen as a SIGEST selection in SIAM Review, 2004, one of the best papers published in SIAM journals in the previous two years.
- Alston Householder Award for the best dissertation in Numerical Algebra, 2002.
- Leslie Fox Prize in Numerical Analysis, Second Prize, 2001.
- Semiconductor Research Corp. Graduate Fellowship, 1999-2000.
- National Science Foundation Graduate Fellowship, 1995-1998.
- Winner of Alice T. Schaler Prize (given by Assoc. for Women in Mathematics), 1994.

Publications (journals and refereed conferenced proceedings)

1. P. Svehla, K. V. Nguyen, J.-R. Li, L. Ciobanu. *Quantitative DLA-based Compressed Sensing for MEMRI Acquisitions*. Submitted.
2. G. Fournet, J.-R. Li, D. Le Bihan, L. Ciobanu. *The influence of acquisition parameters on the metrics of the bi-exponential IVIM model*. Submitted.
3. H. Haddar, J.-R. Li, S. Schiavi. *Understanding the time-dependent diffusion tensor measured by diffusion MRI: the intra-cellular case*. Submitted.
4. G. Fournet, J.-R. Li, A. Cerjanic, B. Sultan, L. Ciobanu, D. Le Bihan. *A two pool model to describe the IVIM cerebral perfusion*. *Journal of Cerebral Blood Flow and Metabolism*. 2016.
5. H. Haddar, J.-R. Li, S. Schiavi. *A macroscopic model for the diffusion MRI signal accounting for time-dependent diffusivity*. *SIAM Journal of Applied Mathematics*. 2016.
6. H. Haddar, J.-R. Li, S. Schiavi. *Adapting the Kärger model to account for finite diffusion-encoding pulses in diffusion MRI*. *IMA Journal of Applied Mathematics*. 2016.
7. F. Caubet, H. Haddar, J.-R. Li, D. V. Nguyen. *New transmission condition accounting for diffusion anisotropy in thin layers applied to diffusion MRI*. *ESAIM: Mathematical Modelling and Numerical Analysis*. 2016.
8. K. V. Nguyen, J.-R. Li, G. Radecki, L. Ciobanu. *DLA based compressed sensing for high resolution MR microscopy of neuronal tissue*. *Journal of Magnetic Resonance*. 2015.
9. H. T. Nguyen, D. Grebenkov, D. V. Nguyen, C. Poupon, D. Le Bihan, J.-R. Li. *Parameter estimation using macroscopic diffusion MRI signal models*

11. J.-R. Li, H. T. Nguyen, D. V. Nguyen, H. Haddar, J. Coatleven, D. Le Bihan. *Numerical study of a macroscopic finite pulse model of the diffusion MRI signal*, Journal of Magnetic Resonance. 2014.
12. D. Grebenkov, D. V. Nguyen, J.-R. Li. *Exploring diffusion across permeable barriers at high gradients. I. Narrow pulse approximation*, Journal of Magnetic Resonance. 2014.
13. D. Nguyen, J.-R. Li, D. Grebenkov, D. Le Bihan. *A finite elements method to solve the Bloch-Torrey equation applied to diffusion magnetic resonance imaging*, Journal of Computational Physics. 2014.
14. J. Coatleven, H. Haddar, J.-R. Li. *A new macroscopic model including membrane exchange for diffusion MRI*, SIAM Journal of Applied Mathematics. 2014.
15. M. Iima, O. Reynaud, T. Tsurugizawa, L. Ciobanu, J.-R. Li, F. Gellroy, B. Djemai, M. Umehana, D. Le Bihan. *Non-Gaussian diffusion MRI assessment of microstructure in rat brain 9L glioma model*, Investigative Radiology. 2014.
16. J.-R. Li, D. Calhoun, C. Poupon, D. Le Bihan. *Numerical simulation of diffusion MRI signals using an adaptive, time-stepping method*. Physics in Medicine and Biology. 2013.
17. D. Grebenkov, H. T. Nguyen, J.-R. Li. *A fast random walk algorithm for computing diffusion-weighted NMR signals in multiscale porous media: a feasibility study for a Menger sponge*, Microporous & Mesoporous Materials. 2013.
18. C.-H. Yeh, B. Schmitt, D. Le Bihan, J.-R. Li, C.-P. Lin, C. Poupon. *Diffusion Microscopist Simulator: A General Monte Carlo Simulation System for Diffusion Magnetic Resonance Imaging*. PLOS ONE. 2013.
19. J.-R. Li. *A fast time stepping method for evaluating fractional integrals*. SIAM Journal on Scientific Computing. 2010.
20. H. Haddar, J.-R. Li, D. Matignon. *Efficient solution of a wave equation with fractional-order dissipative terms*, Journal of Computational and Applied Mathematics. 2010.
21. J.-R. Li, L. Greengard. *High Order Accurate Methods for the Evaluation of Layer Heat Potentials* SIAM Journal on Scientific Computing. 2009.
22. J.-R. Li, D. Calhoun, L. Brush. *Efficient thermal field computation in phase field models*. Journal of Computational Physics. 2009.
23. P. Benner, J.-R. Li, T. Penzl. *Numerical solution of large-scale Lyapunov equations, Riccati equations and linear-quadratic optimal control problems*. Numerical Linear Algebra with Applications. 2008.
24. J.-R. Li, L. Greengard. *On the numerical solution of the heat equation I: fast solvers in free space*. Journal of Computational Physics. 2007.
25. P. Joly, J.-R. Li, S. Fliss. *Exact boundary conditions for periodic waveguides containing a local perturbation*. Communications in Computational Physics. 2006.
26. J. Li. *Low order approximation of the spherical nonreflecting boundary kernel for the wave equation*. Linear Algebra and its Applications. 2006.
27. S. Gugercin, J.-R. Li. *Smith-Type methods for balanced truncation of large sparse systems, Dimension Reduction of Large-Scale Systems*. Proceedings of a Workshop held in Oberwolfach, Germany. Series: Lecture Notes in Computational Science and Engineering. 2005.

28. J.-R. Li, J. White. *Low rank solution of Lyapunov equations*. SIAM Review, SIGEST selection. 2004.
29. J.-R. Li, L. Greengard. *High order marching schemes for the wave equation in complex geometry*. Journal of Computational Physics. 2004.
30. J.-R. Li, L. Greengard. *Strongly consistent marching schemes for the wave equation*. Journal of Computational Physics. 2003.
31. J.-R. Li, J. White. *Low rank solution of Lyapunov equations*. SIAM Journal on Matrix Analysis and Applications. 2002.
32. J.-R. Li, J. White. *Reduction of large circuit models via low rank approximate Gramian*. International Journal of Applied Mathematics and Computer Science. 2001.
33. J.-R. Li, J. White. *Efficient Model Reduction of Interconnect via Approximate System Grammians*. IEEE/ACM International Conference on Computer-Aided Design. Digest of Technical Papers. 1999.
34. J.-R. Li, F. Wang, J. White. *An Efficient Lyapunov Equation-Based Approach for Generating Reduced Order Models of Interconnect*. Design Automation Conference. Proceedings. 1999.
35. J.-R. Li, J. White. *Improving the efficiency of multipole-accelerated method-of-moments solvers using dual grid multipole expansions*. IEEE 6th Topical Meeting on Electrical Performance of Electronic Packaging. Proceedings. 1997.