

# L. GUY RAGUIN

---

CONTACT INFORMATION  
*Home:* 2375 Club Meridian Dr, Apt 9B, Okemos, MI 48864-4523 *Phone:* (517) 706-0283  
*Work:* Department of Mechanical Engineering *E-mail:* [raguin@msu.edu](mailto:raguin@msu.edu)  
Michigan State University *Phone:* (517) 432-3192  
2555 Engineering Building, East Lansing, MI 48824-1226 *Fax:* (517) 353-1750  
*Web:* <http://www.egr.msu.edu/~raguin>

QUALIFICATION SUMMARY  
Research scientist / engineer with over 9 years of experience in Nuclear Magnetic Resonance Imaging (NMR and MRI velocimetry, diffusion-weighted MRI, microscopic MRI). Projects involve pulse sequence development & programming, protocol optimization, image processing, and novel image reconstruction methods, applied to small animal, *ex vivo* specimen and phantom studies, as well as clinical research.

EDUCATION  
**University of Illinois at Urbana–Champaign (UIUC)** *Urbana, Illinois, USA*

- Ph.D., Mechanical Engineering (GPA: 4.00/4.00) October 2004
- M.S., Mechanical Engineering (GPA: 3.96/4.00) January 2000

**Ecole National Supérieure des Mines de Nancy (ENSMN)**  
Institut National Polytechnique de Lorraine (INPL) *Nancy, France*

- Engineering Diploma, Major/Minor: Energy/Materials Science July 1999
- B.S., Major/Minor: Energy/Materials Science July 1998

CURRENT POSITION **Michigan State University (MSU)** *East Lansing, Michigan, USA*  
Assistant Professor, Department of Mechanical Engineering  
Adjunct Assistant Professor, Department of Radiology  
Biomedical Imaging Research Center (BIRC, <http://www.birc.msu.edu>) Aug. 2006-present

- Develops non-invasive diagnostics based on diffusion-weighted MRI and biophysical modeling for neurodegenerative and developmental diseases and aging
- Optimizes diffusion-weighted and perfusion MRI protocols for fibrous soft tissue and skeletal muscle
- Investigates development and treatment of muscle atrophy using MRI/MRS, and stem cell research
- Investigates mixing/separation properties of two-phase flows in 3-D small-scale reactors using MRI
- Develops MRI protocols to extract structural, mechanical, and transport properties of 3-D cell-seeded hydrogel biomaterials under controlled deformation and track cell metabolism using MRS
- Performs functional and molecular MRI experiments using the Bruker 9.4 T AVANCE micro-imager and the GE 3 T EXCITE clinical scanner at BIRC

PROFESSIONAL EXPERIENCE **University of Illinois at Urbana–Champaign** *Urbana, Illinois, USA*  
Research Associate, Biomed. Imaging Center, Lab. of Quant. Visualization Oct. 2004-Aug. 2006

- Developed a quantitative diffusion-weighted MRI model that resolves fiber crossings in fibrous soft tissues, and implemented the corresponding experimental protocol and numerical reconstruction algorithm. Applied the method to human brain pons, a Zebra Finch brain and a rat brain using a Varian/INOVA 14.1 T imaging spectrometer
- Extracted physical and transport properties of hydrogels (PEG, HEMA) using NMR/MRI protocols on Varian/SISCO 4.7 T and Varian/INOVA 14.1 T imaging spectrometers
- Measured velocity fields in complex microfluidic systems using microscopic MRI phase contrast velocimetry protocols on Varian/SISCO 4.7 T and Varian/INOVA 14.1 T imaging spectrometers
- Developed a fast and localized NMR velocimetry method for small channels and unsteady flows

Graduate Research Assistant, Biomedical Imaging Center Jan. 2000-Oct. 2004

- Investigated kinematics, transport and chaotic segregation in complex 3-D swirling flows via MRI techniques (spin-tagging and phase-contrast velocimetry, pulsed-field gradient dispersion measurements) and numerical analysis of dynamical systems
- Developed reconstruction methods for dynamic MRI velocimetry that impose physical constraints and allow for reduced-encoding data acquisition
- Trained graduate students to operate a Varian/SISCO 4.7 T imaging spectrometer

Graduate Research Assistant, Lab. of Quantitative Visualization Jan. 2000-Mar. 2002

- Conducted the experimental study of vibrations effects on local heat flux and ice growth on a plate, instrumented the experimental device with thermocouples, heat flux sensors & PID controllers, and programmed a PC-based data acquisition system using LabVIEW

Graduate Research Assistant, Biomedical Imaging Center Aug. 1998-Dec. 1999

- Designed and conducted electrochemical mass transport experiments, designed and built a swirling reactor, and used spin-tagging MRI velocimetry on a Varian/SISCO 4.7 T scanner
- Responsible for fluid mechanics and heat/mass transport issues in the conception of a mesoscopic water purifier in a multidisciplinary project funded by DARPA

COMPUTER SKILLS

- ◇ Specialized MRI Software: VNMR (Varian), ParaVision (Bruker), FSL, AFNI
- ◇ Other Software: Mathematica, MATLAB, LabVIEW, POV-Ray, GraphicConverter, Photoshop, NIH Image, Noesys, L<sup>A</sup>T<sub>E</sub>X, Microsoft Office, ANSYS.
- ◇ Programming Languages: FORTRAN, C, C++, Pascal, Unix shell scripts (tcsh, bash)
- ◇ Operating Systems: Macintosh (8.x, 9.x, 10.x), Unix, Windows (95, 98, 2000, XP)

RELEVANT INFORMATION

- ◇ Citizenship: French.
- ◇ US Visa status: Permanent resident.

LANGUAGES

- ◇ French: mother tongue.
- ◇ English: fluent (CAE with honors from Cambridge, 9-year residency in the United States).
- ◇ German: rudimentary writing, reading and speaking (ZMP with honors from the Goethe Institute).

PROFESSIONAL ACTIVITIES

- ◇ Attended the "Introduction to ParaVision Course" (Sept. 11–15, 2006) and "Advanced Topics in ParaVision Course" (Apr. 30–May 4, 2007) at Bruker Inc., Billerica, MA, USA.
- ◇ Successfully completed the "Training Tutorial on Human Subject Research Protections", "Animal Use and Care Tutorial" (Oct. 2006), and "Biological Safety Training" (Jan. 2008)
- ◇ Co-chaired the session "Biomedical Engineering I" for the 13<sup>th</sup> International Symposium on Applied Electromagnetics and Mechanics (ISEM 2007) in East Lansing, MI, USA, Sept. 9–12, 2007
- ◇ Chaired the session "Cardiovascular and Pulmonary Systems II" and co-chaired the special session "Magnetic Resonance Imaging of Cardio/Cerebrovascular Flow and Cerebral Transport" at the 3<sup>rd</sup> European Medical & Biological Engineering Conference in Prague (Czech Rep.), Nov. 20–25, 2005
- ◇ Member of the International Society for Magnetic Resonance in Medicine (ISMRM)

SELECTED PUBLICATIONS

**L. G. Raguin**, S. Majumdar, S. S. Udpa, "Design of Optimal Experimental Parameters for Diffusion-Weighted MRI Fibre-Tracking Protocols", Int. J. Appl. Electrom. Mech., in press, 2008.

**L. G. Raguin**, L. Ciobanu, "Multiple echo NMR velocimetry: Fast and localized measurements of steady and pulsatile flows in small channels", J. Magn. Reson., **184**, 337–343, 2007.

J. G. Georgiadis, **L. G. Raguin**, K. W. Moser, "Quantitative Visualization of Taylor–Couette–Poiseuille Flows with MRI", Nuclear Magnetic Resonance Imaging in Chemical Engineering, S.-I. Han, S. Stapf (editors), Wiley-VCH Publishers, Weinheim, Germany, 2005.

K. W. Moser, **L. G. Raguin**, J. G. Georgiadis, "Synchronized EPI Phase Contrast Velocimetry in a Mixing Reactor", Magn. Reson. Imaging, **21**, 127–133, 2003.

K. W. Moser, **L. G. Raguin**, J. G. Georgiadis, "A Tomographic Study of Helical Modes in Bifurcating Taylor-Couette-Poiseuille Flow Using MRI", Phys. Rev. E, **64**, 016319/1–016319/5, 2001.

SELECTED CONFERENCE PRESENTATIONS

C. Bolin, **L. G. Raguin**, "Methodology to Estimate the Pressure Distribution from Noisy Velocity Data", accepted to the 6<sup>th</sup> International Conference on Inverse Problems in Engineering (ICIPE 2008): Theory and Practice, Dourdan, France, June 15–19, 2008.

**L. G. Raguin**, S. Majumdar, S. S. Udpa, "Parameter Estimation Analysis of Diffusion-Weighted MRI Protocols Used for Soft Tissue Fiber Reconstruction", 20<sup>th</sup> Inverse Problem Symposium (IPS07), East Lansing, MI, USA, June 11–12, 2007.

**L. G. Raguin**, et al., "Quantitative Analysis of  $q$ -Space MRI Data: Theoretical and Experimental Validation", 14<sup>th</sup> ISMRM Scientific Meeting, Seattle, Washington, USA, May 6–12, 2006.

**L. G. Raguin**, et al., "Comparison of MRI Velocimetry Protocols for Microchannels", 47<sup>th</sup> Experimental Nuclear Magnetic Resonance Conference (ENC 2006), Pacific Grove, California, USA, April 23–28, 2006.