

Marc-Antoine Fardin

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Occupation

- **Laboratoire MSC*, University Paris Diderot, Paris**
Dep. of Mechanical Engineering, MIT, Boston
PhD Candidate, Teaching Assistant and Fulbright fellow – Physics, 2009-2012
Dir. D^r S. Lerouge and D^r G. McKinley
Shear localization effects and instabilities in complex fluids
- **Cellanyx diagnosis, New York**
100K and NYC Next Idea competitions semi-finalist, Software lead for the start-up

Education

- University Paris Diderot and Massachusetts Institute of Technology – Paris and Cambridge
PhD Candidate, Fulbright fellow – Physics, 2009-2012
- University Paris Diderot – Paris, 2009
Master 2, Magistere – Theoretical Physics of Complex Systems, Honors
- Columbia University – New York, 2008
Visiting graduate student, OGP fellow – Physics
- University Paris Diderot – Paris, 2007
Licence 3, Magistere – Physics, Honors
- University Paris Diderot – Paris, 2006
Licence 1-2 – Physics, Honors
- Baccalaureat, speciality mathematics, 2004, Honors

Past Research Experience

- | | |
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| July 2009 | Dep. of Biological Sciences, National University of Singapore, Singapore
<i>2 months. Research fellow. Dir. P^r M.P. Sheetz</i>
Collective dynamics of actin filaments under membrane tension |
| March 2009 | Laboratoire MSC*, University Paris Diderot, Paris
<i>4 months. Internship. Dir. D^r S. Lerouge</i>
Shear-banding flows and elastic instabilities |
| January 2009 | Dep. of Biological Sciences, Columbia University, New York
<i>2 months. Internship. Dir. D^r O. Rossier & P^r M.P. Sheetz</i>
Stress-induced collective dynamic of a population of actin filaments |
| September 2008 | Laboratoire MSC*, University Paris Diderot, Paris
<i>4 months. Research fellow. Dir. D^r S. Lerouge</i>
Shear-banding flows and elastic instabilities |

- July 2007 **Dep. of Biological Sciences, Columbia University**, New York
1 year. Research fellow. Dir. D^r O. Rossier & P^r M.P. Sheetz
 Cell spreading as a hydrodynamic process
- May 2007 **Laboratoire MSC^{*}, University Paris Diderot** , Paris
3 months. Internship. Dir. D^r S. Lerouge
 Taylor like vortices in the shear-banding flow of wormlike micelles
- September 2006 **Laboratoire MSC^{*}, University Paris Diderot**, Paris
4 months. Part-time internship. Dir. D^r S. Lerouge
 Interface dynamics of a wormlike micelles in shear-banding flow.
- June 2006 **Laboratoire APC^{**}, College de France**, Paris
2 months. Internship. Dir. D^r Y. Giraud Héraud
 Influence of double stars on the research of gravitational microlensing in data of the POINT-AGAPE collaboration

Teaching experience

- September 2009-2012 **University Paris Diderot**, Paris
Teaching assistant. 64 hours/year
- September 2008 **SCRIPT, University Paris Diderot**, Paris
1 an. Teaching assistant.

Publications

1. S. Lerouge, M.A. Fardin, M. Argentina, G. Grégoire and O. Cardoso, Interface dynamics in shear-banding flow of giant micelles, *Soft Matter*, **4**, 1808-1819 (2008)
2. M.A. Fardin, B. Lasne, O. Cardoso, G. Grégoire, M. Argentina, J.P. Decruppe and S. Lerouge, Taylor- like vortices in shear-banding flow of giant micelles, *Phys. Rev. Lett.*, **103**, 028302 (2009)
3. Y. Cai, O. Rossier, N.C. Gauthier, N. Biais, M.A. Fardin, X. Zhang, L.W. Miller, B. Ladoux, V.W. Cornish and M.P. Sheetz, Cytoskeletal coherence requires myosin-IIA contractility, *J. Cell Sci.*, **123** , 413-423 (2010)
4. O.M. Rossier, N. Gauthier, N. Biais, W. Vonnegut, M.A. Fardin, P.D. Avigan, E.R. Heller, A. Mathur, S. Ghassemi, M.S. Koeckert, J.C. Hone, M.P. Sheetz, Force Generated by Actomyosin Contraction Builds Bridges Between Adhesive Contacts, *EMBO J.* **29**,1055-68 (2010).
5. Y. Xiong, P. Rangamani, M.A. Fardin, A. Lipshtat, B. Dubin-Thaler, O. Rossier, M.P. Sheetz and R. Iyengar , Mechanisms controlling cell size and shape during isotropic cell-spreading, *Biophys.J.* **98**, 2136–2146 (2010).
6. M.A. Fardin, D. Lopez, J. Croso, G. Grégoire, O. Cardoso, G.H. McKinley and S. Lerouge, Elastic turbulence in shear-banding flow of giant micelles, *Phys. Rev. Lett.* **104**, 178303 (2010).
7. M.A. Fardin, O.M. Rossier, P. Rangamani, P.D. Avigan, N.C. Gauthier, W. Vonnegut, A. Mathur, J. Hone, R. Iyengar, M.P. Sheetz, Cell spreading as a hydrodynamic process, *Soft Matter* **6**, 4788-4799 (2010).
8. P. Rangamani, M.A. Fardin, Y. Xiong, A. Lipshtat, O. Rossier, M.P. Sheetz, R. Iyengar, Signaling Network Triggers and Membrane Physical Properties Control the Actin Cytoskeleton-Driven Isotropic Phase of Cell Spreading, *Biophys.J.* **100**, 845–857 (2011).
9. N. Gauthier, M.A. Fardin, P. Roca-Cusachs and M.P. Sheetz, Temporary increase in plasma membrane tension coordinates the activation of exocytosis and contraction during cell spreading, *PNAS* **108**, 14467-14472 (2011).
10. M.A. Fardin, T.J. Ober, C. Gay, G. Grégoire, G.H. McKinley and S. Lerouge, Criterion for purely elastic Taylor-Couette instability in the flows of shear-banding fluids, *Eur. Phys. Lett.* **96**, 44004 (2011).

11. M.A. Fardin, T.J. Ober, C. Gay, G. Grégoire, G.H. McKinley and S. Lerouge, Potential "ways of thinking" about the shear-banding phenomenon, *Soft Matter* **8**, 910-922 (2012).
12. M.A. Fardin, T. Divoux, M.A. Guedeau-Boudeville, I. Buchet-Maulien, J. Browaeys, G.H. McKinley, S. Manneville and S. Lerouge, Shear-banding in surfactant wormlike micelles—Elastic instabilities and wall slip, *Soft Matter* (in press).

Oral communications

- May 2011 **Nonlinear Dynamics and Fluid Instabilities in the 21st Century—in honor of J. Gollub**,
Haverford College, PA, USA.
Poster: Elastic instabilities and shear-banding in flows of wormlike micelles.
- July 2010 **Workshop on flow instabilities and turbulence in viscoelastic fluids**,
Lorentz Center, Leiden, Netherlands.
Invited speaker: Elastic instabilities in the flow of wormlike micelles.
- April 2010 **European Rheology Conference**, Goteborg, Sweden.
Speaker: Elastic turbulence in the flow of wormlike micelles.
- September 2009 **IMA workshop on complex fluids**, University of Minn, Minneapolis, MN, USA.
Poster: Elastic turbulence in the flow of wormlike micelles.
- April 2009 **European Rheology Conference**, Cardiff, UK.
Speaker: Elastic instabilities in the flow of wormlike micelles.
- August 2008 **International Rheology Conference**, Monterey, CA, USA.
Speaker: Taylor like vortices in shear-banding flow of wormlike micelles.
- April 2008 **2nd NIH NDC Annual Awardee Meeting**, San Francisco, CA, USA.
- March 2008 **3rd Annual meeting of the Nanotechnology Center for Mechanics in
Regenerative Medicine**, Columbia University, New York, NY, USA
- November 2007 **Pathway-To-Medicine meeting by the Nanotechnology Center for
Mechanics in Regenerative Medicine**, Columbia University, New York, NY, USA

Awards and grants

- December 2011 **Semifinalist NYC Next Idea Competition**, 2011
Semifinalist – Ongoing competition
- March 2011 **Semifinalist MIT 100K**, 2011
Semifinalist of the Life Science track of the MIT 100K competition
- April 2010 **Fulbright fellowship**, 2010-2011
Fellowship of the French commission for doctoral students
- March 2010 **Groupe Français de Rhéologie**, 2010
Travel grant for the 2010 AERC conference
- August 2008 **Society of Rheology**, 2008
Travel grant for the 2008 International Rheology Conference
- March 2007 **Columbia Office of Global Programs**, 2007-2008
One year fellowship for visiting graduate student

Other knowledges

Languages : **English & French** Fluent
 Spanish Fair reading and writing. Poor speaking.

Computers : Programming in C, Java, Fortran, Python and LaTeX. Web pages creation.

Other activities

Running, swimming, climbing. Writing (A novel, ``*Iluvendan*''—ISBN 978-2918541011—published on March 28th 2011).

References

D^r Sandra Lerouge, *Maître de Conference*, University Paris Diderot
D^r Gareth McKinley, *Professor*, Massachusetts Institute of Technology.
D^r Sebastien Manneville, *Professor*, École Normale Supérieure de Lyon, IUF.
D^r Alexander Morozov, *Research Fellow*, University of Edinburgh.
D^r Susan Muller, *Professor*, UC Berkeley.
D^r Michael Sheetz, *Professor*, Columbia University

* *Matiere et Systemes Complexes* ; ** *AstroParticule et Cosmologie*