# Sébastien Motsch

*Assistant Professor*

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## Personal information

Date of birth March 24, 1982 in Toulouse (France)
Nationality French

## Research interests

- Mathematical biology (modeling of complex systems)
- Data-model comparisons
- Micro-macro modeling (diffusion/fluid limits)
- Numerical methods for PDEs

## Employment

2013–present **Assistant Professor**, *Arizona State University*.

2012–2013 **Postdoctoral Fellow**, *University of Texas/University of Maryland (CSCAMM)*, *KI-Net* program, supervised by **Irene Gamba** and **Eitan Tadmor**.

2009–2012 **Postdoctoral Fellow**, *University of Maryland (CSCAMM)*, *FRG* program: *Kinetic equations and complex systems*, supervised by **Eitan Tadmor**.

## Education

2006–2009 **Ph.D.**, *University Paul Sabatier (UPS)*, Toulouse (France).
Title: *Mathematical modeling of animal displacements and derivation of macroscopic models*. Advisers: **Pierre Degond** (Mathematics Institute of Toulouse), **Guy Théraulaz** (Center for Research on Animal Cognition).

2005–2006 **Master 2 applied mathematics**, *UPS*, Toulouse, *summa cum laude*.

2004–2005 **Agrégation of mathematics**, *UPS*, Toulouse.

2003–2004 **Master 1 fundamental mathematics**, *UPS*, Toulouse, *summa cum laude*.

2002–2003 **License fundamental mathematics**, *UPS*, Toulouse, *summa cum laude*.

2000–2002 **Deug MIAS**, *UPS*, Toulouse.

## Publications


[1] P. Degond, J-G. Liu, S. Motsch, V. Panferov, *Hydrodynamic models of self-organized dynamics: derivation and existence theory*, Methods and Applications of Analysis, 20(2):89–114 (2013).

[2] E. Boissard, P. Degond, S. Motsch, *Trail formation based on directed pheromone deposition*, Journal of Mathematical Biology, 66(6):1267–1301 (2013).

[3] S. Motsch, L. Navoret, *Numerical simulations of a non-conservative hyperbolic system with geometric constraints describing swarming behavior*, Multiscale Modeling and Simulation, 9(3):1253–1275 (2011) .

[4] S. Motsch, E. Tadmor, *A new model for self-organized dynamics and its flocking behavior*, Journal of Statistical Physics, Springer, 144(5):923–947 (2011).

[5] C. Appert-Rolland, P. Degond, S. Motsch, *Two-way multi-lane traffic model for pedestrians in corridors*, Networks and Heterogeneous Media, 6(3):351–381 (2011).

[6] P. Degond, S. Motsch, *A macroscopic model for a system of swarming agents using curvature control*, Journal of Statistical Physics, Springer, 141(4):685–714 (2011).

[7] P. Cattiaux, D. Chafai, S. Motsch, *Asymptotic analysis and diffusion limit of the Persistent Turning Walker Model*, Asymptotic Analysis, 67(1-2):17–31 (2010).

[8] J. Gautrais, C. Jost, M. Soria, A. Campo, S. Motsch, R. Fournier, S. Blanco, G. Theraulaz, *Analyzing fish movement as a persistent turning walker*, Journal of Mathematical Biology, 58(3):429–445 (2009).

[9] M. Herty, A. Klar, S. Motsch, F. Olawsky, *A smooth model for fiber lay-down processes and its diffusion approximations*, Kinetic and Related Models, 2(3):489–502 (2009).

[10] G. Bal, J. Garnier, S. Motsch, V. Perrier, *Random integrals and correctors in homogenization*, Asymptotic Analysis, 59(1):1–26 (2008).

[11] P. Degond, S. Motsch, *Continuum limit of self-driven particles with orientation interaction*, Mathematical Models and Method in Applied Sciences, 18(1):1193–1215 (2008).

[12] P. Degond, S. Motsch, *Large-scale dynamics of the Persistent Turning Walker model of fish behavior*, Journal of Statistical Physics, Springer, 131(6):989–1021 (2008).

[13] P. Degond, J-G. Liu, S. Motsch, V. Panferov, *Hydrodynamic models of self-organized dynamics: derivation and existence theory*, Methods and Applications of Analysis, 20(2):89-114.


### Preprint


[14] S. Motsch, M. Moussaïd, E. G. Guillot, M. Moreau, J. Pettré, G. Theraulaz, C. Appert-Rolland, P. Degond, *Inter-pedestrian friction and cluster propagation in crowds*, preprint.

[15] S. Motsch, E. Tadmor, *Heterophilious dynamics enhances consensus*, revision.

[16] P.E. Jabin, S. Motsch, *Asymptotic behavior of consensus models*, submitted.

## Selected invited talks

Dec. 2013 **Classical and Quantum Mechanical Models of Many-Particle Systems**, Oberwolfach, Germany

Jul. 2013 **International conference on conservation laws**, Bangalore, India.

Jan. 2012 **Emergent behaviour in multi-particle systems**, Banff, Canada.

Feb. 2013 **Animal Swarms**, Kfar Blum, Israel.

Sep. 2012 **Populations & Crowds**, Los Angeles, California.

Feb. 2011 **Pedestrian Traffic Flows**, Research Triangle Park, North Carolina.

Nov. 2010 **PDEs in kinetic theories: kinetic description of biological models**, Edinburgh, Scotland.

Aug. 2006 **Random modeling and uncertainty management**, Luminy-Marseille, France.

## Conference organizer

Oct. 2013 Organizer of the conference **Young researchers workshop: Kinetic and macroscopic models for complex systems**, College Park, Maryland.

Jan. 2013 Co-organizer of the conference **Transport Models for Collective Dynamics in Biological Systems**, Raleigh, North-Carolina.

Nov. 2011 Organizer of the mini-symposium **Recent developments in self-organized dynamics** at the **SIAM conference on Analysis on PDEs**, San-Diego, California.

## Memberships

2012–2017 Member of the **KI-Net** network (NSF), founded by Irene Gamba, Shi Jin and Eitan Tadmor

2011–2015 Member of the **MOTIMO** project (ANR-France), founded by Laure Blanc-Feraud, Pierre Degond, Xavier Druart, Franck Plouraboué and Eric Schmitt

## Teaching experience

2013–present **Instructor**, *Linear algebra, numerical analysis*, Arizona State University

2010–2013 **Instructor**, *Advanced calculus, Differential equations*, University of Maryland

2009–2010 **Teaching Assistant**, *Calculus II*, University of Maryland

2006–2009 **Instructor**, *Calculus I-III* and *Introduction to numerical analysis (with Maple/Matlab)*, University of Paul Sabatier (Toulouse)

2005–2006 **Teaching Assistant**, *Calculus I*, University of Mirail (Toulouse)

2003–2004 **Instructor**, *high-school level*, Center CNFPT (Toulouse)

## Skills

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| **Language** | English (fluent), French (native language), Spanish (basic) |
| **Programming** | Fortran, C/C++, Matlab-Octave, R, Python-Sage, Paraview |
| **Computer** | Linux (Ubuntu), Emacs, LaTeX, Shell, Git, Xfig |
| **Web** | Wordpress (`seb-motsch.com`), Flash (`construireonline.com`) |
| **Smartphone** | contribution to the Android app: `Virtual plan 3D` |