

Joceline Lega

Department of Mathematics
 University of Arizona
 Tucson, Arizona 85721-0089, USA
<http://lega.uazmath.org/>

Education

Elève	Ecole Normale Supérieure, Paris	Physics	1984-1988
Licence (B.S)	Université Pierre & Marie curie, Paris	Physics	1985
Maîtrise (M.S)	Université Pierre & Marie curie, Paris	Physics	1985
DEA	University of Nice, France	Dynamical Systems and Turbulence	1986
	Diplôme d'Etudes Approfondies, post-graduate degree		
Doctorat (PhD)	University of Nice, France	Theoretical Physics	1989
	Thesis title: <i>Topological defects associated with the breaking of time translation invariance</i>		

Professional Appointments

2017 – present	Professor, Department of Epidemiology and Biostatistics, College of Public Health, University of Arizona
2006 – present	Professor, Department of Mathematics, University of Arizona
1997 – present	Assistant Professor, Associate Professor, and Professor, GIDP in Applied Mathematics, University of Arizona
2000 – 2006	Associate Professor, Department of Mathematics, University of Arizona
1997 – 2000	Assistant Professor, Department of Mathematics, University of Arizona
1997 – present	On leave without pay from CNRS (French National Center for Scientific Research)
1993 – 1997	Chargée de Recherche 1ère classe at CNRS, Institut Non Linéaire de Nice
1989 – 1993	Chargée de Recherche 2ème classe at CNRS, Laboratoire de Physique Théorique, Nice, France

Administrative Appointments

2016 – present	Coordinator, Postdoctoral Mentoring Program, Department of Mathematics, University of Arizona
2009 – 2013	Director, Institute for Mathematics & Education, University of Arizona
2008 – 2011	Director, Program in Integrated Science, University of Arizona
2007 – 2009	Assistant Director, Institute for Mathematics & Education, University of Arizona

Visiting Positions

Fall 2004	Visitor, Fields Institute for Research in Mathematical Sciences, Toronto, Canada
1994 – 1997	Visiting Assistant Professor, Department of Mathematics, University of Arizona

- Fall 1993 Research Associate, Department of Physics and Applied Physics, University of Strathclyde, Glasgow, UK
- Oct-Dec 1991 Post-doctoral fellow, Department of Applied Mathematics and Theoretical Physics, University of Cambridge, UK
- Jan 90-Jun 91 Visiting Assistant Professor, Department of Mathematics, University of Arizona

Honors & Awards

- First place, DARPA Forecasting Chikungunya Challenge, May 2015
- Fellow of the Institute of Physics (London), 2004
- UA Department of Mathematics Lovelock Award, Spring 2006
- National Academies Education Fellow in the Life Sciences for 2005 – 2006

Editorial Boards

- Editor-in-Chief, *Physica D: Nonlinear Phenomena*, since January 2008
- Editorial Board member, *Nonlinearity*, January 2004 – December 2015
- Editorial Board member, *Physica D: Nonlinear Phenomena*, January 2004 – December 2007

Research Interests

- Modeling of nonlinear phenomena, with applications to physics and biology
- Pattern formation and instabilities
- Dynamics and stability of coherent structures

Synergistic Activities

- Co-organizer, *Sixth International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems*, 2017, University of Arizona, Tucson
- Co-organizer, 2011 Conference on *Geometric Methods for Infinite-Dimensional Dynamical Systems*, Brown University, Providence
- Co-organizer, 2009 and 2010 IM&E Workshops on *Mapping the Calculus Curriculum*, University of Arizona
- Director, 2007 Arizona Summer Program on *Mathematical Modeling*, University of Arizona
- Co-chair, 2006 SIAM conference on *Nonlinear Waves and Coherent Structures*, Seattle
- Co-organizer, 2003 Workshop on *Patterns in Physics* at The Fields Institute, Toronto, Canada
- Co-organizer, SIAM Mini-symposium on the *Validity of Envelope Equations*, 2005 SIAM Conference on Applications of Dynamical Systems, Snowbird
- Organizer, SIAM Mini-symposium on the *Dynamics and Stability of Coherent Structures*, 2003 Joint Mathematics Meeting, Phoenix

Professional Memberships

- American Association for the Advancement of Science (AAAS)
- American Mathematical Society (AMS), 2004-2014
- Association des Anciens Elèves, Elèves et Amis de l'Ecole Normale Supérieure
- Institute of Physics (IOP)
- Program in Applied Mathematics, University of Arizona
- Society for Industrial and Applied Mathematics (SIAM)

Service to the Profession

- External Review Committee member, Department of Applied Mathematics, University of Colorado Boulder, March 2017
- Member, Electorate Nominating Committee, AAAS Section A (Mathematics), 2015 – 2018
- Member-at-Large, AAAS Section A (Mathematics), 2011 – 2015
- Member, Nominating Committee, SIAM Activity Group on *Nonlinear Waves and Coherent Structures*, 2012 & 2014
- Member, *Kruskal Lecture Prize Selection Committee* (SIAM), 2011
- Chair, 2011 *Math Awareness Month* National Committee
- Chair (2008) and member (2007), *AWM-SIAM Kovalevsky Lecture Prize Selection Committee*
- Chair, Nominating Committee, SIAM Activity Group on *Nonlinear Waves and Coherent Structures*, 2006
- Secretary, SIAM Activity Group on *Nonlinear Waves and Coherent Structures*, 2004 – 2006
- Reviewer for major journals in my area of research
- Reviewer for the National Science Foundation (NSF), the Engineering and Physical Sciences Research Council (EPSRC, UK), the US-Israel Binational Science Foundation (BSF), the Natural Sciences and Engineering Research Council of Canada (NSERC), the Netherlands Organization for Scientific Research (NWO), and Université Côte d'Azur (UCA)

Past and Current Funding

- 2017 – 2018: *The Sixth International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems*, National Science Foundation (P.I. Jim Cushing)
- 2015 – 2020: *DARPA Chikungunya Challenge Prize*, DARPA
- 2012 – 2013: *Intel Math National Training Agency: Revision of the Intel Math Curriculum*, Intel Foundation
- 2011 – 2012: *Intel Math National Training Agency*, Intel Foundation
- 2009 – 2011: *Intel Math National Training Agency*, Intel Foundation
- 2009 – 2015: *NSF GK-12: Graduate Students and Teacher Engaging in Mathematical Sciences (G-TEAMS)*, National Science Foundation
- 2008: *Laptops for the Program in Integrated Science*, Gateway Strategic Alliance Grant, The University of Arizona

- 2008 – 2011: *Explorations in Integrated Science: An Interdisciplinary Laboratory Course*, National Science Foundation (P.I. Gail Burd)
- 2007 – 2009: *Q-Bio: Integration of Quantitative Concepts into Introductory Biology*, National Science Foundation (P.I. Kate Dixon)
- 2006 – 2009: *Imaging of markers for skin cancer risk*, Arizona Biomedical Research Commission (P.I. Kate Dixon)
- 2004 – 2008: *Current problems in nonlinear dynamics: Macroscopic modeling of microscopic interactions and instability of coherent structures*, National Science Foundation
- 2003 – 2004: *Junior US-based Mathematicians at 03/04 Special Year at Fields Institute*, National Science Foundation
- 2003 – 2006: *New Mathematical Modeling Course*, TRIF (Technology and Research Initiative Fund), The University of Arizona
- 2000 – 2004: *Hydrodynamics of bacterial colonies*, National Science Foundation (U.S. – France Cooperative Research)
- 2000 – 2004: *Analysis and modeling of pattern formation in biological and physical systems*, National Science Foundation
- 1999 – 2000: *Hydrodynamics of bacterial colonies*, The University of Arizona Research Foundation
- 1997 – 1999: *Modeling of filament dynamics with applications to bacterial growths*, NATO Collaborative Research Grant (with A. Goriely and M. Tabor)
- 1994 – 1996: *Dynamic response, stabilisation, modulation and control of semiconductor lasers and laser amplifiers*, European Union

Publications

59 peer-reviewed publications (see <http://lega.uazmath.org/> for links to articles), listed below

3 articles in progress, not listed

11 articles in books, not listed

1. J. Lega, H.E. Brown, R. Barrera, *Aedes aegypti* (Diptera: Culicidae) abundance model improved with relative humidity and precipitation-driven egg hatching, *J. Med. Entomol.* **54**, 1375–1384 (2017).
2. H.E. Brown, R. Barrera, A.C. Comrie, J. Lega, *Effect of temperature thresholds on modeled Aedes aegypti population dynamics*, *J. Med. Entomol.* **54**, 869–877 (2017).
3. J. Lega and H.E. Brown, *Data-driven outbreak forecasting with a simple nonlinear growth model*, *Epidemics* **17**, 19–26 (2016)
4. N.D. Brubaker and J. Lega, *Capillary induced deformations of a thin elastic sheet*, *Phil. Trans. R. Soc.* **A 374**, 20150169 (2016)
5. N.D. Brubaker and J. Lega, *Two-dimensional capillary origami*, *Phys. Lett.* **A 380**, 83–87 (2016)
6. H. E. Brown, A. Young, J. Lega, T. G. Andreadis, J. Schurich, A. Comrie, *Projection of Climate Change Influences on U.S. West Nile Virus Vectors*, *Earth Interactions* **19**, 1–18 (2015)
7. N. D. Brubaker and J. Lega, *Two-Dimensional Capillary Origami with Pinned Contact Line*, *SIAM J. Appl. Math.* **75**, 1275–1300 (2015)

8. A. E. Lindsay, J. Lega, K. B. Glasner, *Regularized model of post-touchdown configurations in electrostatic MEMS: interface dynamics*, IMA Journal of Applied Mathematics, doi: 10.1093/imamat/hxv011 (2015)
9. A.E. Lindsay, J. Lega, K.B. Glasner, *Regularized model of post-touchdown configurations in electrostatic MEMS: Equilibrium analysis*, Physica **D 280-281**, 95–108 (2014)
10. J.C. Lega, S. Buxner, B. Blonder, F. Tama, *Explorations in Integrated Science*, Journal of College Science Teaching **43**, 55-60 (2014)
11. D.E. Moulton and J. Lega, *Effect of disjoining pressure in a thin film equation with non-uniform forcing*, Euro. Jnl of Applied Mathematics **24**, 887-920 (2013)
12. A.E. Lindsay, J. Lega, F.J. Sayas, *The Quenching Set of a MEMS Capacitor in Two-Dimensional Geometries*, J. Nonlinear Sci. **23**, 807-834 (2013)
13. A.E. Lindsay and J. Lega, *Multiple Quenching Solutions of a Fourth Order Parabolic PDE with a Singular Nonlinearity Modeling a MEMS Capacitor*, SIAM J. Appl. Math. **72**, 935-958 (2012)
14. J. Lega, *Collective Behaviors in Two-dimensional Systems of Interacting Particles*, SIAM J. Appl. Dyn. Sys. **10**, 1213-1231 (2011)
Erratum: SIAM J. Appl. Dyn. Syst. **12**, 2093–2093 (2013)
15. S. Lafortune, J. Lega, and S. Madrid, *Instability of local deformations of an elastic rod: numerical evaluation of the Evans function*, SIAM J. Appl. Math. **71**, 1653-1672 (2011)
16. M. Herrera-Valdez and J. Lega, *Reduced models for the pacemaker dynamics of cardiac cells*, Journal of Theoretical Biology **270**, 164-176 (2011)
17. D. Moulton and J. Lega, *Reverse draining of a magnetic soap film - Analysis and simulation of thin film equation with non-uniform forcing*, Physica D **238**, 2153-2165 (2009)
18. J. Lega and T. Passot, *Hydrodynamics of bacteria colonies*, Nonlinearity **20**, C1-C16 (2007)
19. S. Lafortune and J. Lega, *Spectral stability of local deformations of an elastic rod: Hamiltonian formalism*, SIAM J. Math. Anal. **36**, 1726-1741 (2005)
20. J. Lega and T. Passot, *Hydrodynamics of bacterial colonies: phase diagrams*, Chaos **14**, 562-570 (2004)
21. J. Lega and T. Passot, *Inverse cascade and energy transfer in forced low-Reynolds number two-dimensional turbulence*, Fluid Dynamics Research **34**, 289-297 (2004)
22. S. Lafortune and J. Lega, *Instability of local deformations of an elastic rod*, Physica D **182**, 103-124 (2003)
23. J. Lega and T. Passot, *Hydrodynamics of bacterial colonies: a model*, Phys. Rev. E **67**, 031906 1-18 (2003)
24. B.R. Schöne, J. Lega, K.W. Flessa, D.H. Goodwin and D.L. Dettman, *Reconstructing daily temperatures from growth rates of the intertidal bivalve mollusk *Chione cortezi* (northern Gulf of California, Mexico)*, Palaeogeography, Palaeoclimatology, Palaeoecology **184**, 131-146 (2002)
25. T.A. Christensen, G. D'Alessandro, J. Lega and J.G. Hildebrand, *Morphometric modeling of olfactory circuits in the insect antennal lobe: I. Simulations of spiking local interneurons*, Biosystems **61**, 143-153 (2001)
26. J. Lega, *Traveling hole solutions of the complex Ginzburg-Landau equation: a review*, Physica D **152-153**, 269-287 (2001)
27. J. Lega and A. Goriely, *Pulses, fronts and oscillations of an elastic rod*, Physica D **132**, 374-392 (1999).
28. J. Lega and N. Mendelson, *A control-parameter dependent Swift-Hohenberg equation as a model for bioconvection patterns*, Phys. Rev. **E 59**, 6267-6274 (1999)
29. N. Mendelson and J. Lega, *A complex pattern of traveling stripes is produced by swimming cells of *Bacillus subtilis**, Journal of Bacteriology **180**, 3285-3294 (1998)
30. S. Bottin and J. Lega, *Pulses of tunable size near a subcritical bifurcation*, Eur. Phys. J. B **5**, 299-308 (1998)

31. O. G. Calderón, V. M. Pérez-García, J. Lega, and J. M. Guerra, *Loss-induced transverse effects in lasers*, Opt. Comm. **143**, 315-321 (1997)
32. D. Hochheiser, J.V. Moloney and J. Lega, *Controlling optical turbulence*, Phys. Rev. A **55**, 4011-4014 (1997)
33. J. Lega and S. Fauve, *Traveling hole solutions to the complex Ginzburg-Landau equation as perturbations of Nonlinear Schrödinger dark solitons*, Physica **102 D**, 234-252 (1997)
34. J. Lega and J.M. Vince, *Temporal forcing of traveling wave patterns*, J. Phys. I France **6**, 1417-1434 (1996)
35. G.K. Harkness, J. Lega, and G.L. Oppo, *Measuring disorder with correlation functions of averaged patterns*, Physica D **96**, 26-29 (1996)
36. M.R.E. Proctor and J. Lega, *Secondary bifurcations and symmetry breaking as a route towards spatiotemporal disorder*, Int. J. Bifurcation and Chaos **5**, 841 (1995)
37. J. Lega, J.V. Moloney, and A.C. Newell, *Universal description of laser dynamics near threshold*, Physica D **83**, 478-498 (1995)
38. G. K. Harkness, J.C. Lega and G.L. Oppo, *Correlation functions in the presence of optical vortices*, Chaos, Solitons and Fractals **4**, 1519-1533 (1994)
39. J. B. Geddes, J. Lega, J.V. Moloney, R.A. Indik, E.M. Wright and W.J. Firth, *Pattern selection in passive and active nonlinear optical systems*, Chaos, Solitons and Fractals **4**, 1261-1274 (1994)
40. J. Lega, J.V. Moloney, and A.C. Newell, *Swift-Hohenberg equation for lasers*, Phys. Rev. Lett. **73**, 2978-2981 (1994)
41. J. Lega, P.K. Jakobsen, J.V. Moloney, and A.C. Newell, *Nonlinear transverse modes of large-aspect-ratio homogeneously broadened lasers: II. Pattern analysis near and beyond threshold*, Phys. Rev. A **49**, 4201-4212 (1994)
42. P.K. Jakobsen, J. Lega, Q. Feng, M. Staley, J.V. Moloney, and A.C. Newell, *Nonlinear transverse modes of large-aspect-ratio homogeneously broadened lasers: I. Analysis and numerical simulation*, Phys. Rev. A **49**, 4189-4200 (1994)
43. J.V. Moloney, P.K. Jakobsen, J. Lega, S.G. Wenden and A.C. Newell, *Space-time complexity in nonlinear optics*, Physica D **68**, 127-134 (1993)
44. A. C. Newell, T. Passot and J. Lega, *Order parameter equations for patterns*, Ann. Rev. Fluid Mech. **25**, 399-453 (1993)
45. J. Lega, S. Jucquois, B. Jانياud and V. Croquette, *Localized phase jumps in wave trains*, Phys. Rev. A **45**, 5596-5604 (1992)
46. F. Daviaud, J. Lega, P. Bergé, P. Couillet and M. Dubois, *Spatio-temporal intermittency in a 1-d convective pattern: theoretical model and experiments*, Physica D **55**, 287-308 (1992)
47. J. Lega, *Secondary Hopf bifurcation of a one-dimensional periodic pattern*, Eur. J. Mech. B/Fluids **10**, #2 - Suppl., 145 (1991)
48. P. Couillet, J. Lega and Y. Pomeau, *Dynamics of Bloch walls in a rotating magnetic field: a model*, Europhys. Lett. **15**, 221 (1991)
49. J. Lega, *Defect-mediated turbulence*, Computer Methods in Applied Mechanics and Engineering **89**, 419-424 (1991)
50. Y. Pomeau and J. Lega, *Structures macroscopiques en spirales comme configurations d'équilibre d'un ensemble de molécules chirales*, C. R. Acad. Sci. Paris II **311**, 1135 (1990)
51. S. Ciliberto, P. Couillet, J. Lega, E. Pampaloni and C. Perez-Garcia, *Defects in roll-hexagon competition*, Phys. Rev. Lett. **65**, 2370-2373 (1990)

52. P. Couillet, J. Lega, B. Houchmanzadeh and J. Lajzerowicz, *Breaking chirality in nonequilibrium systems*, Phys. Rev. Lett. **65**, 1352-1355 (1990)
53. L. Gil, J. Lega and J.L. Meunier, *Statistical properties of defect-mediated turbulence*, Phys. Rev. A **41**, 1138-1141 (1990)
54. J. Lega, *Forme spirale de la dislocation des ondes stationnaires*, C. R. Acad. Sci. Paris, **309** II, 1401 (1989)
55. P. Couillet, L. Gil, and J. Lega, *A form of turbulence associated with defects*, Physica **37** D, 91-103 (1989)
56. P. Couillet, L. Gil, and J. Lega, *Defect-mediated turbulence*, Phys. Rev. Lett. **62**, 1619-1622 (1989)
57. P. Couillet, L. Gil, and J. Lega, *Une forme de turbulence associée aux défauts topologiques*, Bulletin de la Société Française de Physique, **67**, 12 (1988); and Mathematical Modeling and Numerical Analysis **23**, 385-394 (1989)
58. P. Couillet and J. Lega, *Defect-mediated turbulence in wave patterns*, Europhys. Lett. **7**, 511 (1988)
59. P. Couillet, C. Elphick, L. Gil, and J. Lega, *Topological defects of wave patterns*, Phys. Rev. Lett. **59**, 884-887 (1987)

Invited Scholarly Presentations

101 invited scholarly presentations

Invited presentations in the last 5 years are listed below

1. *Touchdowns in one and two dimensions*; Applied Interdisciplinary Mathematics seminar, University of Michigan, 7 September 2012
2. *Touchdowns in one and two dimensions*; Special session on Nonlinear Waves and Patterns, 1084th AMS Meeting, University of Akron, Akron, OH, October 20-21, 2012
3. *Dynamics of a thin film equation with disjoining pressure and non-uniform forcing*; Special session on Geometrical Methods in Mechanical and Dynamical Systems, 1085th AMS Meeting, University of Arizona, Tucson, AZ, October 27-28, 2012
4. *Grain boundaries of the Swift-Hohenberg and regularized Cross-Newell equations*; Special session on Traveling Waves and Patterns, 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, July 07-11, 2014
5. *How defects are born*; Organized session on Geometric Techniques in the Analysis of Traveling Waves, The Ninth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, Athens, GA, April 01-04, 2015
6. *How defects are born*; Session on Patterns in Complex Systems, The 1st Annual Meeting of SIAM Central States Section, Rolla, MO, April 11-12, 2015
7. *Modeling the spread of Chikungunya in in the Caribbean and Central America*; DARPA Chikungunya Challenge Finale, Washington, DC, May 12, 2015
8. *Capillary Origami*; Mathematics Colloquium, University of Central Florida, November 5, 2015
9. *Explorations in Undergraduate Education*; Seminar, University of Central Florida, November 6, 2015
10. *How Defects are Born*; Session on Pattern Formation in Nonlinear Systems, 2015 SIAM conference on Analysis of Partial Differential Equations, Scottsdale, AZ, December 7-10, 2015

11. *Defects in the Swift-Hohenberg Equation*; Session on Existence and Stability of Nonlinear Waves and Patterns, 2016 SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia, PA, August 8-11, 2016
12. *Flu forecasting with EpiGro*; Seasonal Influenza Forecasting Workshop, Centers for Disease Control and Prevention, Atlanta, GA, August 31 – September 1, 2016
13. *The phase structure of grain boundaries*; Special Session on Nonlinear Waves: Analysis and Numerics, 1126th AMS Meeting, College of Charleston, Charleston, SC, March 10-12, 2017
14. *The phase structure of grain boundaries*; Applied Mathematics Colloquium, IIMAS, Universidad Nacional Autónoma de México, Mexico City, Mexico, April 19, 2017
15. *Three models to help understand the spread of mosquito-borne diseases*; 10th IIMAS Colloquium, Universidad Nacional Autónoma de México, Mexico City, Mexico, April 20, 2017
16. *Patterns, defects, and phase singularities*; Rocky Mountain Partial Differential Equations Conference, Provo, UT, 18 – 19 May, 2017
17. *The Phase Structure of Grain Boundaries*; Session on Spatiotemporally Complex Patterns, 2017 SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 21 – 25, 2017
18. *Forecasting the Flu with Simple Nonlinear Models*; Seasonal Influenza Forecasting Workshop, Centers for Disease Control and Prevention, Atlanta, GA, August 28 – 29, 2017

Service to the University of Arizona

➤ University

- Academic Program Review Committee: Ecology and Evolutionary Biology
- Faculty Senate: 2014-2015
- University Promotion and Tenure Committee: senior co-chair (2011-2012), junior co-chair (2010-2011), and member (2009-2010)
- University Learning Technologies Center Faculty Advisory Board: 2005-2009
- Provost's Task Force on Core Mathematics: 2005-2006

➤ College of Science

- Integrated Science Advisory Board, College of Science: 2007-2008
- Grade Appeal Committee, College of Science: 1997-2002, 2014

➤ Department of Mathematics

- Biomath Committee: 2006-2010
- Computer Committee: 2001-2003 (chair)
- Graduate Committee: 2005-2007, 2016-2017
- Instructional Faculty Personnel Committee: 2012-2014
- Lovelock Award Committee: 2006-2009
- Peer-review Committee: 2012-2014
- Personnel Committee: 2000-2002, 2008-2010, 2014-2015, 2016-2018

- Planning Committee: 2009-2012, 2014-2015, 2016-2017 (chair)
- Promotion and Tenure Committee: 2004-2005, 2017-2019 (chair)
- Undergraduate Committee: 2005-2009

- Program in Applied Mathematics
 - Analysis and its Applications seminar: co-organizer, 2005-2007
 - Applied Mathematics Colloquium: co-organizer, 1998-1999, 2006-2007
 - Self-study Committee: 2001-2002
 - Admissions Committee: 2000-2001, 2016-2017