

## Vivek N. Prakash, Ph.D.

Stanford University  
Department of Bioengineering  
Shriram Center, Prakash Lab, Room 064  
443 Via Ortega  
Stanford, California, USA 94305

Email: [vprakash@stanford.edu](mailto:vprakash@stanford.edu)  
Website: <http://www.vprakash.com>  
Google scholar: <http://goo.gl/3DTmqp>

## Research Interests

- Biological fluid mechanics — low and intermediate  $Re$  swimming & feeding in marine invertebrates
- Biological physics — tissue to organism scale: cell rearrangements, morphogenesis, development
- Fluid mechanics — high  $Re$  turbulent particle-laden flows, mantle convection

## Education

- **Postdoc, Biophysics**, Stanford University (2014 - present)
- **Ph.D. Applied Physics**, University of Twente, The Netherlands (2013)
- **M.S. Engineering Mechanics**, JNCASR, Bangalore, India (2009)
- **B.E. Mechanical Engineering**, R.V. College of Engineering, Bangalore, India (2007)

## Research Experience

- **Postdoctoral Researcher** (Jan 2014 – present)  
Department of Bioengineering, Stanford University  
*Advisor:* Prof. Manu Prakash  
*Project 1:* Quantitative cellular mapping of large-scale morphogenetic fields in a basal metazoan  
*Project 2:* Hydrodynamics of swimming and feeding in starfish larvae  
*Project 3:* Mapping morphogenetic fields in chick embryos (collaboration with L. Maya-Ramos and Prof. T. Mikawa at University of California, San Francisco)
- **Ph.D. Candidate** (2009 – 2013)  
Physics of Fluids group, University of Twente, The Netherlands  
*Advisors:* Prof. Detlef Lohse and Prof. Chao Sun  
*Ph.D. Thesis:* "Light particles in turbulence" [[web link](#)]  
*Committee:* M. Bourgoin (LEGI, Grenoble), F. Toschi (TU Eindhoven), L. van Wijngaarden (Twente)  
*Collaborators:* Y. Tagawa (TUAT, Tokyo), E. Calzavarini (Univ. Lille), J. M. Mercado (NTU Singapore)
- **M.S. Research Scholar** (2007 – 2009)  
Engineering Mechanics Unit,  
Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore, India  
*Advisors:* Prof. K. R. Sreenivas and Prof. Jaywant H. Arakeri (IISc)  
*M.S. Thesis:* "An experimental study of mantle convection"
- **Summer Undergraduate Research Fellow** (2005 – 2006)  
Engineering Mechanics Unit, JNCASR, Bangalore, India  
*Advisors:* Prof. K. R. Sreenivas and Prof. Jaywant H. Arakeri (IISc)  
*Project:* The role of viscosity contrast on plume structures in mantle convection

## Publications

### Postdoctoral Research: Organismal and Developmental Biophysics

8. W. Gilpin, **Vivek N. Prakash**, and M. Prakash  
*Vortex arrays and ciliary tangles underlie the feeding-swimming tradeoff in starfish larvae*  
**Nature Physics** (2016) (<http://dx.doi.org/10.1038/nphys3981>) (advance online publication)  
 - News & Views: V. I. Fernandez & R. Stocker, Hydrodynamics: Modus vivendi, *Nature Physics* (2016)  
 - APS/DFD 'Milton van Dyke Award' (Video) - 2016  
 - 'First place', Nikon Small World in Motion Competition - 2016  
 - 'Image of distinction', Nikon Small World Photomicrography Competition - 2016

### Doctoral Research: Particle-laden Turbulent flows

7. **Vivek N. Prakash**, J. M. Mercado, L. van Wijngaarden, E. Mancilla, Y. Tagawa, D. Lohse, and C. Sun  
*Energy spectra in turbulent bubbly flows*  
**Journal of Fluid Mechanics**, 791, 174-190 (2016)
6. V. Mathai, **Vivek N. Prakash**, J. Brons, C. Sun and D. Lohse  
*Wake-driven dynamics of finite-sized buoyant spheres in turbulence*  
**Physical Review Letters**, 115, 124501 (2015)
5. Y. Tagawa, I. Roghair, **Vivek N. Prakash**, M. van Sint Annaland, H. Kuipers, C. Sun, and D. Lohse  
*The clustering morphology of freely rising deformable bubbles*  
**Journal of Fluid Mechanics**, 721, R2 (2013)
4. **Vivek N. Prakash**, Y. Tagawa, E. Calzavarini, J. M. Mercado, F. Toschi, D. Lohse, and C. Sun  
*How gravity and size affect the acceleration statistics of bubbles in turbulence*  
**New Journal of Physics**, 14, 105017, (2012)  
 - Featured in New Journal of Physics 'Research Highlights' collection - 2012, 2013  
 - Part of New Journal of Physics focus issue on 'Dynamics of Particles in Turbulence' - 2013  
 - New Journal of Physics Video Abstract Prize - 2013
3. J. M. Mercado\*, **Vivek N. Prakash\***, Y. Tagawa, C. Sun, and D. Lohse  
*Lagrangian statistics of light particles in Turbulence*  
**Physics of Fluids**, 24, 055106 (2012)  
 (\*Equal authorship)
2. Y. Tagawa, J. M. Mercado, **Vivek N. Prakash**, E. Calzavarini, C. Sun, and D. Lohse  
*Three-dimensional Lagrangian Voronoi analysis for clustering of particles and bubbles in turbulence*  
**Journal of Fluid Mechanics**, 693, 201-215 (2012)

### Masters Research: Mantle convection

1. **Vivek N. Prakash**, K. R. Sreenivas, and J. H. Arakeri  
*The role of viscosity contrast on plume structure in laboratory modeling of mantle convection*  
**Chemical Engineering Science**, 158, 245-256 (2017)

### Publications under preparation:

1. W. Gilpin, **Vivek N. Prakash**, and M. Prakash  
*Flowtrace: a simple visualization tool for biological fluid flows* (2016)  
 (bioRxiv preprint: <http://dx.doi.org/10.1101/086140>)

2. **Vivek N. Prakash**, A. Bhargava, and M. Prakash  
*Mechanics-based morphogenesis in a basal metazoan* (2016)
3. **Vivek N. Prakash**, and M. Prakash  
*Quantitative techniques for cellular mapping of large-scale morphogenetic fields* (2016)

## Honors & Awards

- 2016 — APS/DFD Milton van Dyke Award (Video)
- 2016 — First place, Nikon Small World in Motion Competition
- 2016 — Image of distinction, Nikon Small World Photomicrography Competition
- 2015 — Honorable mention, Nikon Small World in Motion Competition
- 2013 — New Journal of Physics 'Video Abstract Prize' (based on world-wide public voting)
- 2012, 2013 — New Journal of Physics 'Research Highlights' (Prakash, et al., New J. Phys, 2012)
- 2012 — Jury's Choice Poster Award, Hands-On Research in Complex Systems School, China
- 2008 — Marie Curie Scholarship (EU) award to attend Euromech Fluid Mechanics Conference, UK
- 2007-2009 — JNCASR graduate scholarship, Department of Science & Technology, Govt. of India
- 2007 — Attended the International Astronautical Congress (IAC) (ISRO National student selection)
- 2007 — Best Outgoing Student award in ME, RVCE (Cognizant Technology Solutions)
- 2006 — LG electronics scholarship, 'potential manager award' for the best student in ME, RVCE
- 2005-2006 — JNCASR Summer Research Fellowship (Undergraduate)
- 2004-2005 — Diploma in Space Sciences (Honors Course), St. Joseph's College, Bangalore & ISRO
- 2003 — Youth Leadership Award, Global Young Leaders Conference, Washington D.C. & NY, USA

## Professional Courses & Schools

- 2015 – *Developmental Biology in the Ocean*, Hopkins Marine Station of Stanford University (3 weeks)
- 2015 – *Preparing for Faculty Careers*, Stanford University (2 weeks)
- 2012 – *Hands-On Research in Complex Systems Advanced Study Institute*, Shanghai, China (2 weeks)
- 2012 – *New Challenges in Turbulence Research II*, Ecole de Physique, Les Houches, France (1 week)
- 2010 – *Tutorial School on Fluid Dynamics: Topics in Turbulence*, University of Maryland (2 weeks)
- 2009, 2010 – *J.M.B.C. courses: Experimental Techniques* (UTwente), *PIV* (TUDelft), Netherlands (1 week)

## Talks & Seminars

### Invited Seminars:

- 2013 — JMBC Multi-phase flow group meeting, TATA Steel Europe, The Netherlands
- 2013 — FOM-DROP Meeting, TU Delft, The Netherlands
- 2012 — Stanford University, Department of Bioengineering
- 2012 — University of California, Berkeley, Fluid Mechanics Seminar

- 2012 — University of California, San Diego, Department of Physics
- 2011 — JMBC Turbulence group meeting, TU Eindhoven, The Netherlands

#### Selected Conference Talks and Posters:

- 2015 — *Pan-American Society for Evolutionary Developmental Biology Meeting (poster)*, UC Berkeley, USA
- 2014 — *American Physical Society, 67th Annual Meeting - DFD*, San Francisco, USA
- 2014 — *Active Fluids: Bridging Complex Fluids and Biofluids (poster)*, Aspen, USA
- 2013 — *European Turbulence Conference (ETC) 14*, Lyon, France
- 2013 — *Particles in Turbulence Conference*, Eindhoven, The Netherlands
- 2012 — *American Physical Society, 65th Annual Meeting - DFD*, San Diego, USA
- 2012 — *9th Euromech Fluid Mechanics Conference*, University of Rome, Tor Vergata, Italy
- 2012 — *Particles in Turbulence workshop*, Lorentz Center, Leiden, The Netherlands
- 2011 — *American Physical Society, 64th Annual Meeting - DFD*, Baltimore, USA
- 2011 — *Particles in Turbulence Conference*, University of Potsdam, Germany
- 2010 — *American Physical Society, 63rd Annual Meeting - DFD*, Long Beach, USA
- 2010-2013 — *Physics@FOM Meeting (poster)*, Veldhoven, The Netherlands
- 2010-2013 — *JMBC Burgersdag (poster)*, The Netherlands
- 2008 — *7th Euromech Fluid Mechanics Conference*, Manchester, UK

## Mentoring Experience

### Mentoring Ph.D. students

- William Gilpin (at Stanford University) (Sep 2015 - present)
- Varghese Mathai (at University of Twente) (June - Dec 2013)
- Ernesto Mancilla (at University of Twente) (visitor from UNAM, Mexico) (July - Dec 2012)

### Mentoring MSc. students (at University of Twente)

- Jon Brons (Aug - Dec 2013)
- Tobias Foertsch (Aug 2012 - Aug 2013)
- Huanshu Tan (visitor from Shanghai University) (Jan - Apr 2013)

## Teaching Experience

### At University of Twente:

- Teaching assistant, *Experimental Techniques in Physics of Fluids (graduate course)* (2011 – 2013)  
Instructor: Prof. Chao Sun  
Duties: Supervised 1-week lab assignment projects, totally 9 students over three years.  
Occasionally delivered class lectures and conducted lab demonstrations.
- Teaching assistant, *Physics of Fluids (undergraduate course)* (2010)  
Instructor: Prof. Jacco Snoeijer  
Duties: Prepared and graded weekly assignment problem sets, and conducted class tutorials.

## Service

- Peer-review — Referee for *Journal of Fluid Mechanics*, *Physics of Fluids*, *Journal of Theoretical Biology*, *European Journal of Mechanics / B Fluids*
- Outreach — Numerous lab demonstrations for a wide variety of audiences
- Volunteering — Student volunteer for *APS-DFD Meeting*, San Francisco, USA (2014)
- Organization — Friday afternoon Shriram center basement seminar series - 'Happy to talk science hour' at Stanford University, funded by a VPGE SPICE grant (2014 - 2016)

## Media coverage

- **Dec 2016** — Nature Physics publication [web link]
  - Stanford News: "Starfish larvae create complex water whorls to eat and run" [web link]
  - Phys.org: "Starfish larvae create complex water whorls to eat and run" [web link]
  - Live Science: "Starfish Larvae Churn Whirlpools With 100,000 Tiny Hairs" [web link]
  - Science Daily: "Starfish larvae create complex water whorls to eat and run" [web link]
  - EurekAlert: "Starfish larvae create complex water whorls to eat and run" [web link]
  - Futurity: "Why baby starfish make these pretty whorls in water" [web link]
  - EarthSky: "The water whorls of baby starfish" [web link]
  - ACSH: "Revealing The Wonders Of How Starfish Survive And Grow" [web link]
  - SciGuru: "Starfish larvae create complex water whorls to eat and run" [web link]
- **Dec 2016** — First place, Nikon Small World in Motion Competition [video link]
  - Nikon: "Time-lapse revealing water patterns of starfish larva wins Nikon Small World in Motion Competition" [web link]
  - Smithsonian: "Prize-Winning Videos Capture Mesmerizing, Microscopic World" [web link]
  - Live Science: "Tiny Starfish Larva Mesmerizes in Award-Winning Video" [web link]
  - Seeker: "Hunting Starfish Larva Takes the Top Prize in Micro Video Competition" [web link]
  - BBC Focus Magazine: "Nikon Small World in Motion brings photomicrography to life" [web link]
- **Dec 2016** — APS/DFD Milton van Dyke Award (Video) [video link]
  - Vox: "This is how a baby starfish eats. It involves vortexes of doom." [web link]
  - FYFD: "Starfish larvae create beautiful vortices to help themselves catch food." [web link]
- **Dec 2015** — Honorable mention, Nikon Small World in Motion Competition [video link]
  - Huffington Post: "18 Award-Winning Videos: Hidden micro realm is beautiful" [web link]
  - The Atlantic Video: "Incredible Video Taken Through a Microscope" [web link]
- **Aug 2013** — New Journal of Physics 'Video Abstract Prize' [video link]
  - Featured on the front pages of New Journal of Physics and University of Twente
  - News coverage: University of Twente: "UT Researchers win NJP video competition" [web link]
  - Dutch media: RTV-OOST NL, Tubantia NL

## References

Prof. Manu Prakash  
Assistant Professor,  
Dept. of Bioengineering,  
Stanford University,  
California, USA  
manup@stanford.edu

Prof. Detlef Lohse  
Professor and Chair,  
Physics of Fluids group,  
University of Twente,  
The Netherlands  
d.lohse@utwente.nl

Prof. Chao Sun  
Professor,  
Dept. of Thermal Engineering,  
Tsinghua University,  
China  
chaosun@tsinghua.edu.cn

Prof. K. R. Sreenivas  
Professor and Chairman,  
Engineering Mechanics Unit,  
JNCASR,  
Bangalore, India  
krs@jncasr.ac.in

Prof. Jaywant H. Arakeri  
Professor,  
Mechanical Engineering Dept.,  
Indian Institute of Science,  
Bangalore, India  
jaywant@mecheng.iisc.ernet.in

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