

Denis Terwagne

Professional Address

Services de Sciences des Polymères, Faculté des sciences,
Université Libre de Bruxelles (ULB),
Boulevard du Triomphe, CP223,
B-1050, Brussels, Belgium

Phone +32 (0)2 650 57 88

E-mail Denis.Terwagne@ulb.ac.be

Research Interests

Experiments. Soft matter, physical hydrodynamics, elasticity of thin structures, fluid-structure interactions, surface tension-driven phenomena, nonlinear dynamics, self-organization systems, biologically inspired physics, biomimicry.

Employment

- 2014–present **Assistant Professor**, *Université Libre de Bruxelles (ULB)*, Brussels, Belgium.
- 2011–2013 **Postdoctoral Associate**, *Massachusetts Institute of Technology*, Cambridge, USA.
Fulbright, BAEF and WBI World Postdoctoral Fellow, *Massachusetts Institute of Technology*, Cambridge, USA.
- 2006–2011 **Graduate Teaching Assistant**, *University of Liège*, Liège, Belgium.

Education

- 2006–2011 **Ph.D. in Physics**, *University of Liège*, Liège (Belgium), Thesis Title: "Bouncing droplets, the role of deformations" (Advisors: S. Dorbolo and N. Vandewalle).
- 2010 **Visiting Graduate Student**, *Massachusetts Institute of Technology - Department of Mathematics*, Cambridge (USA), three months stay (Advisor: J. W. M. Bush).
- 2006–2008 **Diplôme d'Etudes Approfondies**, *University of Liège*, Liège (Belgium), *The Highest Honors*, Thesis: "Bouncing droplet: bouncing mechanism and self-propulsion" (Advisors: S. Dorbolo and N. Vandewalle).
- 2007 **Visiting Graduate Student**, *MSC - Université Paris Diderot-Paris 7*, Paris (France), one month stay (Advisor: Y. Couder).
- 2002–2006 **Licence en Science Physique**, *University of Liège*, Liège (Belgium), *The Highest Honors*, Final Work Title: "Experimental Study of the delay of coalescence of a bouncing droplet" (Advisor: S. Dorbolo).

Fellowships

- 2011 **Fulbright Fellow**, The Fulbright Program - Commission For Educational Exchange between the United States, Belgium and Luxembourg.
- 2011 **Belgian American Education Foundation (B.A.E.F.) Fellow**

Awards and Prizes

- 2013 **Prix des Amis de l'Université de Liège**, *Laureate of the 2012-2013 edition*.
- 2010 **1st Prize Winner of the Gallery of Nonlinear Images video contest**, *APS March Meeting*, Portland (USA), Mar. 15-19.
Cellular Faraday instability.
- 2009 **2nd Prize Winner of the Gallery of Nonlinear Images video contest**, *APS March Meeting*, Pittsburgh (USA), Mar. 16-20, most downloaded paper during two successive months in *Chaos Journal*.
The mayonnaise droplet.

- 2008 **2nd prize of the BPS 2008 best poster presentation (EPJ poster contest)**, *International Scientific Meeting 2008 of the Belgian Physical Society (BPS)*, Bruxelles (Belgium), May 21.
A drop of spectroscopy.
- 2008 **Award of the Gallery of Nonlinear Images video contest**, *APS March Meeting*, New Orleans (USA), Mar. 10-14.
From bouncing to boxing.
- 2005 **Winner of the Gallery of Fluid Motion video contest**, *APS Division of Fluid Dynamics Meeting*, Chicago (USA), Nov. 20-22.
Dancing droplets onto liquid surfaces.

Grants

- 2012 **National Science Foundation Postdoctoral Fellowship (F.R.S.-FNRS, Belgium)** supporting a 3 years post-doctoral research, not started as being hired at the present job.
- 2011 **Wallonie-Bruxelles International WBI.World Excellence Grant** supporting a two years post-doctoral research at the Massachusetts Institute of Technology, Cambridge (USA), Nov. 2011 to Nov. 2013.
- 2011 **Fulbright Visiting Scholarship** from the Fulbright Program - Commission For Educational Exchange between the United States, Belgium and Luxembourg supporting a one year post-doctoral research at the Massachusetts Institute of Technology, Cambridge (USA), Nov. 2011 to Nov. 2012.
- 2011 **Belgian American Education Foundation (BAEF) Grant** supporting a one year post-doctoral research at the Massachusetts Institute of Technology, Cambridge (USA), Nov. 2011 to Nov. 2012.

Teaching Experience

- 2013–2014 **Phys-F308 Matière Condensée**, *Université Libre de Bruxelles*, Bruxelles, Belgium.
- 2013–2014 **Phys-F313 Laboratoire de Matière Condensée**, *Université Libre de Bruxelles*, Bruxelles, Belgium.
- 2011–2013 **Undergraduate Research Opportunities Program (UROP)**, *Massachusetts Institute of Technology*, Cambridge, USA.
Supervised students to perform high profile research within the EGS.Lab.
- 2012–2013 **1.101 Introduction to Civil and Environmental Engineering Design**, *Massachusetts Institute of Technology*, Cambridge, USA.
Mentored student teams for laboratory design and experimental measurement campaign (12h/year).
- 2011–2013 **1.007 EES-Lab: Engineering for Environment and Sustainability**, *Massachusetts Institute of Technology*, Cambridge, USA.
Developed and taught a new experimental module on digital fabrication and rapid prototyping in modern building technologies (4h/year).
- 2006–2011 **Tutorial Classes of General Physics (1st year students, 80h/year)**, *University of Liège*, Belgium.
- 2006–2011 **Tutorial Classes and Laboratories of Thermodynamics (2nd year students, 15h/year)**, *University of Liège*, Belgium.
- 2006–2011 **Tutorial Classes and Laboratories of Statistical Physics (3rd year students, 30h/year)**, *University of Liège*, Belgium.

Invited Seminars

1. Group for Research and Applications in Statistical Physics (GRASP) Lab Seminar, University of Liège, Liège (Belgium), Sept. 10, 2014.
Drag Control through Wrinkling on Curved Surfaces. (Oral pres.)
2. Physical and Mathematical Seminar, Massachusetts Institute of Technology (MIT), Cambridge (USA), Nov. 5, 2013.
Drag Control through Wrinkling on Curved Surfaces. (Oral pres.)
3. Soft Matter Lab Seminar, Yale University, New Haven (USA), Oct. 30, 2013.
Drag Control through Wrinkling on Curved Surfaces. (Oral pres.)

4. Séminaire du laboratoire Interfaces et Fluides Complexes, Université de Mons, Mons (Belgium), Jan. 9, 2013.
Déformations de surface: de la manipulation des gouttes au contrôle de la traînée aérodynamique d'un objet. (Oral pres.)
5. Séminaire du groupe du Centre Interdisciplinaire de Phénomènes Non-linéaires et de Systèmes Complexes (Cenoli), Université Libre de Bruxelles, Bruxelles (Belgium), Jun. 19, 2009.
Objets Rebondissants Non Investigués (Oral pres.)

Contributed Talks

1. Condensed Matter in Paris: CMD25-JMC14, Paris (France), Aug. 24-29, 2014.
Drag Control through Wrinkling on Curved Surfaces
2. Flow14 - 1st International Conference on MICRO & NANOFUIDICS - Fundamentals and Applications, Twente (The Netherlands), May 18-21, 2014.
Double emulsion in a bouncing compound droplet
3. APS March Meeting, Baltimore (USA), Mar. 18-22, 2013.
Drag Control through Wrinkling on Curved Surfaces
4. 65th APS Division of Fluid Dynamics Meeting, San Diego (USA), Nov. 18-20, 2012.
Drag Control through Wrinkling on Curved Surfaces
5. Fluid and Elasticity, La Jolla (USA), Nov. 14-16, 2012.
Drag Control through Wrinkling on Curved Surfaces
6. New England Workshop on the Mechanics of Materials and Structures, Providence (USA), Nov. 3, 2012.
Drag Control through Wrinkling on Curved Surfaces
7. 31st Rencontres de Physique Statistique, ESPCI, Paris (France), Jan. 27-28, 2011.
Le bol tibétain
8. 30th Rencontres de Physique Statistique, ESPCI, Paris (France), Jan. 28-29, 2010.
The mayonnaise droplet.
9. 62nd APS Division of Fluid Dynamics Meeting, Minneapolis (USA), Nov. 22-24, 2009.
The mayonnaise droplet.
10. Cost P21 meeting, Bucharest (Romania), May 4-6, 2009.
A drop of spectroscopy.
11. 61st APS Division of Fluid Dynamics Meeting, San Antonio (USA), Nov. 23-25, 2008.
A droplet of spectroscopy.
12. 28th Rencontres de Physique Statistique, ESPCI, Paris (France), Jan. 24-25, 2008.
Le pousse-pousse à gougouttes.
13. Cost P21 meeting, Twente (The Netherlands), Oct. 8, 2007.
The lifetime of bouncing droplets.
14. Flow in glassy systems European Rheology School, Les Houches (France), Feb. 05-09, 2007.
The role of deformation in the bouncing droplet problem.
15. 27th Rencontres de Physique Statistique, ESPCI, Paris (France), Jan. 25-26, 2007.
Le rôle de la déformation dans le problème de la goutte rebondissante.
16. ESTEC Workshop (organized by ESA), Noordwijk (The Netherlands), Apr. 2005.
Phase transition in granular gases.

Press Releases (non exhaustive list)

WebTV ULg Oct. 2011 – Le 15ème jour Oct. 2011 – Réflexions ULg 14 Oct. 2011 – Journal Le Soir (Belgium) 4 Jul. 2011 – Volkskrant (The Netherlands) 2 Jul 2011 – Science News 1 Jul. 2011 – Physics Central 1 Jul. 2011 – Scientific American 1 Jul. 2011 – USA Today 1 Jul. 2011 – CBS News 1 Jul. 2011 – Futura-Sciences 1 Jul. 2011 – NewScientist 1 Jul. 2011 – ScienceNow 1 Jul. 2011 – Nature News Blog 1 Jul. 2011 – BBC News 1 Jul. 2011.

universcience.tv (WebTV) 11 Feb. 2011 – ScienceNews (magazine) 19 Dec. 2009 – spektrumdirekt 20 Oct. 2009 – Technology Review 20 Feb. 2009 – Au quotidien, RTBF 26 Dec. 2008 – Réflexions ULg 17 Dec. 2008 – Athena (magazine) Dec. 2008 – New Scientist 19 Nov. 2008 – Scientific American 18 Nov. 2008

References

Prof. Pedro M. Reis

Department of Mechanical Engineering
and Department of Civil and Environmental Engineering
Massachusetts Institute of Technology
77 Massachusetts Avenue, #1-330
Cambridge, MA 02139-4307, USA
+1 617 324 3325
preis@mit.edu

Prof. Nicolas Vandewalle

Department of Physics
University of Liège
Allée du 6 Août, 17
Liège 4000, Belgique
+32 4 366 3703
nvandewalle@ulg.ac.be

Dr. Stéphane Dorbolo

Department of Physics
University of Liège
Allée du 6 Août, 17
Liège 4000, Belgique
+32 4 366 3656
s.dorbolo@ulg.ac.be

Prof. John W.M. Bush

Department of Mathematics
Massachusetts Institute of Technology
77 Massachusetts Avenue, # 2-346
Cambridge, MA 02139-4307, USA
+1 617 253 4387
bush@math.mit.edu

Peer-Reviewed Publications

1. D. Terwagne, M. Brojan and P. M. Reis, accepted in Advanced Materials (2014).
Smart Morphable Surfaces for Aerodynamic Drag Control.
2. S. Tianxiang, J. Liu, D. Terwagne, P. M. Reis and K. Bertoldi, accepted in Soft Matter (2014).
Buckling of an elastic rod embedded on an elastomeric matrix: planar vs. non-planar configurations.
3. D. Terwagne, F. Ludewig, N. Vandewalle and S. Dorbolo, Phys. Fluids 25, 122101 (2013).
The role of the droplet deformations in the bouncing droplet dynamics.
4. S. Gier, S. Dorbolo, D. Terwagne, N. Vandewalle and C. Wagner, Phys. Rev. E 86, 066314 (2012).
Bouncing of polymeric droplets on liquid interfaces.
5. N. Vandewalle, L. Clermont, D. Terwagne, S. Dorbolo, E. Mersch, G. Lumay and N. Vandewalle, Phys. Rev. E 85, 041402 (2012).
Symmetry breaking in a few-body system with magnetocapillary interactions.
6. S. Dorbolo, M. Brandenbourger, F. Damanet, H. Dister, F. Ludewig, D. Terwagne, G. Lumay, and N. Vandewalle, Eur. J. Phys. 32, 1465 (2011).
Granular gas in a periodic lattice.
7. G. Delon, D. Terwagne, S. Dorbolo, N. Vandewalle and H. Caps, Phys. Rev. E 84, 046320 (2011).
Impact of liquid droplets on granular media .
8. D. Terwagne and J.W.M. Bush, Nonlinearity 24, R51-R66 (2011). Recommended by Professor D. Lohse.
Tibetan singing bowl.
9. N. Vandewalle, M. Noirhomme, J. Schockmel, E. Mersch, G. Lumay, D. Terwagne, and S. Dorbolo, Phys. Rev. E 83, 021403 (2011).
Hysteretic behaviour in three-dimensional soap film rearrangements.
10. J. Zawala, S. Dorbolo, D. Terwagne, N. Vandewalle and K. Malysa, Soft Matter 7, 6719-6726 (2011).
Bouncing bubble on a liquid/gas interface resting or vibrating.
11. G. Delon, D. Terwagne, N. Adami, A. Bronfort, N. Vandewalle, S. Dorbolo and H. Caps, Chaos 20, 041103 (2010).
Faraday instability on a network.

12. D. Terwagne, T. Gilet, N. Vandewalle and S. Dorbolo, Coll. Surf. A : Physicochem. Eng. Aspects 365, 178-180 (2010).
Double emulsion in a compound droplet.
13. S. Dorbolo, D. Terwagne, R. Delhalle, J. Dujardin, N. Huet, N. Vandewalle and N. Denkov, Coll. Surf. A : Physicochem. Eng. Aspects 365, 43-45 (2010).
Antibubble lifetime : Influence of the bulk viscosity and of the surface modulus of the mixture.
14. D. Terwagne, T. Gilet, N. Vandewalle and S. Dorbolo, Langmuir 26, 11680-11685 (2010).
From a bouncing compound drop to a double emulsion.
15. T. Gilet, D. Terwagne and N. Vandewalle, Eur. Phys. J. E 31, 253-262 (2010).
Droplet sliding on fibres.
16. D. Terwagne, N. Mack, S. Dorbolo, T. Gilet, J.-Y. Raty and N. Vandewalle, Chaos 18, 041104 (2009).
The mayonnaise droplet.
17. N. Vandewalle, D. Terwagne, T. Gilet, H. Caps and S. Dorbolo, Coll. Surf. A : Physicochem. Eng. Aspects 344, 42-47 (2009).
Antibubbles, liquid onions and bouncing droplets
18. T. Gilet, D. Terwagne and N. Vandewalle, Appl. Phys. Lett. 95, 014106 (2009).
Digital microfluidics on a wire.
19. D. Terwagne, T. Gilet, N. Vandewalle and S. Dorbolo, Phys. Fluids 21, 054103 (2009).
Metastable bouncing droplets.
20. D. Terwagne, T. Gilet, N. Vandewalle and S. Dorbolo, Chaos 18, 041104 (2008).
From bouncing to boxing.
21. S. Dorbolo, D. Terwagne, N. Vandewalle and T. Gilet, New J. Phys. 10, 113021 (2008).
Resonant and rolling droplets.
22. A. Eddi, D. Terwagne, E. Fort and Y. Couder, Europhys. Lett. 82, 44001 (2008).
Wave propelled ratchets and drifting rafts.
23. T. Gilet, D. Terwagne, N. Vandewalle and S. Dorbolo, Phys. Rev. Lett. 100, 167802 (2008).
Dynamics of a bouncing droplet onto a vertically vibrated interface.
24. D. Terwagne, N. Vandewalle and S. Dorbolo, Phys. Rev. E 76, 056311 (2007).
Lifetime of a bouncing droplet.
25. N. Vandewalle, D. Terwagne, K. Mulleners, T. Gilet and S. Dorbolo, Phys. Fluids 18, 091106 (2006).
Dancing droplets onto liquid surfaces.

Book Chapter

T. Gilet, D. Terwagne, N. Vandewalle and S. Dorbolo, Drop and Bubble Interfaces Vol. 2, in Progress in Colloid and Interface Science, (Brill Publ., Leiden, 2011).
Chapter entitled *Manipulation of droplets onto a planar interface.*

National Publications

D. Terwagne, T. Gilet, N. Vandewalle and S. Dorbolo, Physica Magazine 30 n. 3, 07-09/2008, pp161-168 (2008).
A drop of spectroscopy.