
CURRICULUM VITAE

PEDRO MIGUEL REIS

■ PERSONAL DETAILS:

Name: Pedro Miguel Reis

Date of Birth: 30th April, 1978

Nationality: Portuguese

Address: Department of Mathematics, #2-335,
Massachusetts Institute of Technology,
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■ ACADEMIC QUALIFICATIONS:

Oct00-Nov04: Ph.D. in Physics at the Manchester Centre for Nonlinear Dynamics, Univ. of Manchester, UK. Thesis title: “*Dynamics of granular segregation in driven binary monolayers*” (supervisor: Prof. Tom Mullin)

Sep99-Jun00: Certificate of Advanced Studies in Mathematics (*Part III Mathematics*) at St. John’s College and Department of Applied Mathematics and Theoretical Physics (DAMTP), Univ. of Cambridge, UK. Essay title: “*Continuum modeling of granular materials*” (supervisor: Prof. Herbert Huppert).

Sep96-Jun99: First class B.Sc. (Honours) in Physics, Department of Physics and Astronomy, Univ. of Manchester, UK.

■ EMPLOYMENT HISTORY AND RESEARCH EXPERIENCE:

Jul07-present: Faculty Instructor. Department of Mathematics, Massachusetts Institute of Technology, Cambridge, USA.

Oct05-Jun07: Post-Doctoral position. Centre National de Recherche Scientifique (CNRS) and Lab. PMMH, ESPCI (Ecole Supérieure de Physique et de Chimie Industrielles), Paris, France (with José Bico and Benoit Roman).

Oct04-Sep05: Post-Doctoral assistantship at the Benjamin Levich Institute, CUNY, New York, USA (with Prof. Mark Shattuck).

Jan-Sep04: Visiting research associate at the Benjamin Levich Institute, CUNY, New York, USA.

Sep-Dec03: Visiting scholar at St. Edmund’s College, Univ. of Cambridge and long term visitor at the “*Granular and particle-laden flows*” research programme at the Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.

Aug-Oct00: Visiting researcher at the Centre for Nonlinear Dynamics, Univ. of Texas at Austin, USA, (with Prof. Harry Swinney).

summers of 97 & 98: Summer research student at the MCND, Univ. of Manchester, UK, (with Prof. Tom Mullin).

■ PRIZES AND AWARDS:

- Dec08: MIT-France Seed Fund:** *Elasticity and Interfaces*. Towards strengthening a collaboration with José Bico and Benoit Roman from the PMMH Laboratory, ESPCI, Paris.
- Nov08: Winner in the poster category of the Gallery of Fluid motion** (with S. Jung, J. James, C. Clanet and J.W.M. Bush) – ‘Capillary Origami in Nature’ – American Physical Society, Division of Fluid Dynamics Meeting 2008, San Antonio, USA.
- Mar08: Winner in the video category of the GSNP Image Gallery** (with B. Audoly and B. Roman) – ‘Oscillatory fracture paths in thin sheets’ – American Physical Society, March Meeting 2008, New Orleans, USA.
- Mar06: Carl Storm International Diversity Fellowship** for the 2006 Granular & Granular-Fluid Flow Gordon Research Conference, Queen’s College, Oxford, UK.
- 1999–2004: Scholarships** from the Foundation for Science and Technology, Portuguese Ministry of Science: Doctoral grant from the POCTI programme (4 years: 2000–2004) and Master’s grant from the PRAXIS XXI programme (1 year: 1999–2000).
- Sep03: Bursary** from the Cambridge Philosophical Society and admitted as Junior Member of the Isaac Newton Institute for Mathematical Sciences.
- Sep02: Skinner Prize** from the Royal Society of Chemistry at Faraday Discussion 123 for the best poster presentation.
- Mar00:** Admitted to the status of fellow of the Cambridge European Society.
- Jul98: “The PPARC Award for the Best Physics Student in the UK”** at The Science, Technology and Engineering Awards of 1998, London, UK.
- Aug00: Scholarships** at the Univ. of Cambridge: Benefactor’s Scholarship (St. John’s College). European Student Bursary (Cambridge European Trust, Trinity College).
- 1997–2002: Scholarships and prizes** at the Univ. of Manchester: John Bink prize, 2002 (for the best 1st year Ph.D. student). Platt Prize, 1999 (for the best final year B.Sc. project). Hatfield Scholarship, 1998 (for the best second year exam performance). Delta Prize, 1997 (for the best first year essay).
- May96:** Joined the Portuguese Physics Olympic Team (of five) and entered the “**27th International Physics Olympiads**”, Oslo, Norway.

■ TEACHING:

- Spring 09, Spring 10** Nonlinear Dynamics II : Continuum Systems (18.354), MIT, USA.
- Fall 08, Fall 09** Undergraduate Seminar in Physical Applied Mathematics (18.384), MIT, USA.
- Fall 07, Spring08:** Multivariable Calculus (18.02), MIT, USA.

■ STUDENT SUPERVISION:

- Jan08-present:** The elasto-pipette: grabbing water with thin elastic sheets (Jillian James, Undergraduate Research Opportunity Program MIT).
- Sep07-present:** Self-assembly in bacteria-colloids binary mixtures, (Mitul Luhar, Master’s graduate student, MIT).
- Sep07-Dec08:** Fluid mechanics of drinking in felines, (Anthony Jones and Wissam Jarjoui, Undergraduate Research Opportunity Program MIT).

- Sep07-Aug08:** The Clapping Book: Interaction between fluid flow and multiple thin sheets, (Saba Mohsin and Rita Ciaravino, Undergraduate Research Opportunity Program, MIT).
- Feb08-Jun08:** Coiling of falling elastic ropes, (Sunshine Zhou, Undergraduate Research Opportunity Program, MIT).
- Mar-Jun06:** Anti-cracks and the venation network in growing leaves, (final year project of the Engineering program at ESPCI, Paris, France).
- Apr06:** On the biometrics of *Petroselinum crispum* (Curly Parsley), (Erasmus research project, ESPCI, Paris, France).
- Jan-Aug05:** Oscillatory instabilities of driven quasi-static cracks in thin polymer films (independent research project, Bronx High School, NY).
- Jun-Aug02:** Pattern formation of granular segregation in a thin rotating drum (summer project for high school student, Manchester, UK).
- Jan-Apr01:** Event driven molecular dynamics simulations of a randomly driven granular gas (Master of Physics final year project. Univ. Manchester, UK).
- Jan-Apr00:** Dynamics and stability of a Levitron (Master of Physics final year project, Univ. Manchester, UK).

■ ACADEMIC SERVICE

- Organizer and session chair** ‘*Elasticity and Geometry of Thin Objects*’, March Meeting, American Physical Society in New Orleans, LA (2008), Pittsburgh, PA (2009) and Portland, OR (2010 *upcoming*).
- Session chair** ‘*Brittle Fracture*’, 16th European Conference of Fracture, July 2006, Alexandroupolis, Greece.
- Referee:** Science, Physical Review Letters, Journal of Statistical Physics, Experimental Mechanics, Mechanics Research Communications.

■ LANGUAGES:

- Portuguese:** Mother-tongue. **English:** Fluent reading, writing and speaking: **French:** Fluent speaking and reading. **Spanish:** Fluent speaking and reading. **Basque:** Beginner.

■ LIST OF PUBLICATIONS:

- [A.23] D. Sen, K. Novoselov, **P. Reis** and M.J. Buehler, ‘Tearing of graphene sheets from adhesive substrates produces tapered nanoribbons’, *submitted* (2009).
- [A.22] K. Bertoldi, **P.M. Reis**, S. Willshaw and T. Mullin, ‘Novel negative Poissons ratio behavior induced by an elastic instability’, *Adv. Mater* **21**, 1 (2009).
- [A.22] M. D. Shattuck, R. A. Ingale, and **P.M. Reis**, ‘Granular Thermodynamics’, *AIP Conf. Proc.* **1145**, 43 (2009).
- [A.20] **P.M. Reis**, F. Corson, A. Boudaoud and B. Roman, ‘Localization through surface folding in solid foams under compression’ *Phys. Rev. Lett.*, **103**, 045501 (2009).
- [A.19] D. Vella, J. Bico, A. Boudaoud, B. Roman and **P.M. Reis** ‘The macroscopic delamination of thin films from elastic substrates’, *Proc. Natl. Acad. Sci. U.S.A.* **106**, 10901 (2009).
- [A.18] S. Jung, **P. M. Reis**, J. James, C. Clanet and J.W.M. Bush, ‘Capillary origami in nature’ *Phys. Fluid*, accepted, **21** 091110 (2009).
- [A.17] **P. M. Reis**, B. Roman and B. Audoly, ‘Cracking Sheets’ *Chaos* **18**, 041108 (2008).
- [A.16] E. Hamm, **P.M. Reis**, M. LeBlanc, B. Roman, E. Cerda, ‘Tearing as a test for mechanical characterization of thin adhesive films’, *Nature Materials* **96**, 386 (2008). Featured on the **Front Cover**.
- [A.15] **P.M. Reis**, A. Kumar, B. Roman and M. D. Shattuck, ‘The Unizip Instabilities: straight to oscillatory transitions in the cutting of thin elastic sheets’, *EuroPhys. Lett.* **82**, 64002 (2008).
- [A.14] **P.M. Reis**, R.A. Ingale and M.D. Shattuck, ‘Forcing independent velocity distributions in an experimental granular fluid’, *Phys. Rev. E* **74**, 051311 (2007).
- [A.13] **P.M. Reis**, R.A. Ingale and M.D. Shattuck, ‘Caging dynamics in a granular fluid’, *Phys. Rev. Lett.*, **98**, 188301 (2007).
- [A.12] **P.M. Reis**, T. Sykes and T. Mullin, ‘Phases of granular segregation in a binary mixture’, *Phys. Rev. E*, **74**, 051306 (2006).
- [A.11] **P.M. Reis**, R.A. Ingale and M.D. Shattuck, ‘Crystallization of a quasi-two-dimensional granular fluid’, *Phys. Rev. Lett.* **96**, 258001 (2006).
- [A.10] **P.M. Reis**, B. Roman and B. Audoly ”Oscillating fracture paths in thin elastic sheets: when geometry rules the fracture path”, in *Fracture of Nano and Engineering Materials and Structures*, page 119 (Springer 2006).
- [A.9] B. Audoly, B. Roman and **P.M. Reis**, ‘Cracks in brittle thin sheets: When geometry rules the fracture path’, *Phys. Rev. Lett.* **95**, 025502 (2005).
- [A.8] B. Audoly, B. Roman and **P.M. Reis**, ‘Comment on The cycloidal wake of a cylinder tearing through a thin sheet’, *Phys, Rev. Lett.* **94**, 129601 (2005).
- [A.7] G. Ehrhardt, A. Stephenson and **P.M. Reis**, ‘Segregation mechanisms in a numerical model of a binary granular mixture’, *Phys. Rev. E* **71**, 041301 (2005).
- [A.6] B. Audoly, **P.M. Reis** and B. Roman, ‘Oscillating fracture paths in thin brittle sheets’, *Proc. of the XI International Conference on Fracture, Turin, Italy* ed. A. Carpinteri (2005).
- [A.5] B. Roman, B. Audoly and **P.M. Reis**, ‘La Déchirure en fermeture éclair’, *Pour la Science*, **323**, 24 (2004).
- [A.4] **P.M. Reis**, G. Ehrhardt, A. Stephenson and T. Mullin, ‘Gases, liquids and crystals in granular segregation’, *Europhys. Lett.* **66**, 357 (2004)
- [A.3] **P.M. Reis**, G. Ehrhardt and T. Mullin, ‘Segregation phases in a vibrated binary granular layer’, in *Unifying concepts in the Physics of Glasses and Granular media* eds. A. Coniglio, A. Fierro, H.J. Herrmann and M. Nicodemi , page 99 (Elsevier Science 2003).

[A.2] B. Roman, **P.M. Reis**, B. Audoly, S. de Villiers, V. Vignie and D. Vallet, ‘Oscillatory fracture paths in thin elastic sheets’, *C.R. de Mecanique* **331**, 881 (2003).

[A.1] **P.M. Reis** and T. Mullin, ‘Granular segregation as a critical phenomena’, *Phys. Rev. Lett.* **89**, 244301 (2002).

■ SELECTED PRESS COVERAGE:

[B.17] ‘Materials Science: Squeezing Holes’, Marc S. Levine, Editor’s Choice: Highlights of the Recent Literature, *Science* **325**, 1601 (2009). [html, pdf].

[B.16] ‘High Flex: failing stickers lead to research that could improve stretchable electronics’ *Technology Review*, September/October 2009.

[B.15] Online press coverage of our article on delamination blisters [A19]: Nanowerk, Science Daily, EU-Cordis, Inside Engineer, ZDNet, Gizmag, Physorg, Frost & Sullivan.

[B.14] ‘A curvy, stretchy future for electronics’, John A. Rogers, and Yonggang Huang, Commentry, *Proc. Natl. Acad. Sci. U.S.A.* **106**, 10875 (2009).

[B.13] ‘Material mechanics: An angle on sticky films’, J. Groenewold, News and Views, *Nature Materials*, **7** 348 (2008).

[B.12] ‘A Sticky Issue’, Davide Castelvetti, *Science News*, **173** 12 (2008).

[B.11] Audio coverage of our article [A.16] : Interview for Morning Edition (April 2, 2008), National Public Radio (USA). Interview of B. Roman for ‘Le journal de 7h’ (April, 29, 2008), RTL Radio (France). Interview of B. Roman for RSR’s (Switzerland) ”La Science de Pain” (May 26, 2008). Scientific American 60-Second Science.

[B.10] International press coverage of our article [A.16]: MIT TechTalk (USA); MIT News Office Press Release (USA); El Mercurio (Chile); USACH Al Da (Chile); The Globe and Mail (Canada); Malaysia Sun (Malazya); Daily India (India); Cincia Hoje (Portugal); deFrente Albrica (Portugal); KIJK (Holland); Publico (Spain); NyTeknik (Sweden); Pour la Science (France); Science et Avenir (France); Le figaro (France); La Croix (France); CNRS Press Release (France); Le Matin (Switzerland); GEO (Germany).

[B.9] Online coverage of our article [A.16]: MIT Homepage, CNN, MSNBC, NanoWerk, Science Daily, Eurekalert, Physorg, Yahoo News, Live Science, Ars Technica, Inovations-Report, Science News Daily

[B.7] ‘Crumpling, buckling, and cracking: Elasticity of thin sheets’, M. Marder, R. D. Deegan and E. Sharon, *Physics Today*, **60** (2), 33, February (2007).

[B.6] ‘Rock’n’Roll in der Petrischale’, *Physik Journal*, **5** 18 (2006).

[B.5] ‘Shaky Equilibrium’, *Phys. Rev. Focus*, **17** 24 (2006).

[B.4] ‘Cracked it’, Research Highlights, *Nature*, **436** 306 (2005).

[B.3] ‘Envelope physics sheds light on ice sheets’, *Nature Science Update*, 2 Dec. (2003).

[B.2] ‘Granular Games’, *Nature Materials*, **2**, 6 (2003).

[B.1] ‘A Poor Mix’, Research Highlights, *Nature Physics Portal*, 25 Nov. (2002).

■ INVITED CONFERENCE TALKS AND SEMINARS:

• ‘Elasticity of thin sheets at interfaces’:

[C.33 Aug09] Mechanical and Materials Sciences Study Group, Schlumberger-Doll Research, Cam-

bridge, USA.

[C.32 Apr09] Mechanics Seminar Series, Civil and Environmental Eng., Massachusetts Institute of Technology, USA.

[C.31 Apr09] Condensed Matter Seminar, Physics Department, University of Massachusetts at Amherst, USA.

[C.30 Mar09] Invited Focus Session, “*Polymer Surface Instabilities*”, March Meeting of the American Physical Society, Pittsburgh, USA.

[C.29 Feb09] MMEC Seminar Series. Mechanical Engineering, Massachusetts Institute of Technology, USA.

[C.28 Nov08] Computations in Science Seminars, Chicago Materials Research Center, University of Chicago, USA.

[C.27 Nov08] Squishy Physics Seminar, Harvard University, USA.

[C.26 Jul08] Leiden Institute of Physics, Holland.

• *‘Tearing as a test for mechanical characterization of thin adhesive films’:*

[C.25 Apr08] Invited lecture for the course ‘Mechanics and Materials II’ (Professor Mary Boyce) Department of Mechanical Engineering, Massachusetts Institute of Technology, USA.

• *‘Cracking Sheets: Coupling elasticity of thin films with fracture’:*

[C.24 Oct07] MMEC Seminar Series. Mechanical Engineering, Massachusetts Institute of Technology, USA.

• *‘The venation network in leaves as Anticracks?’*

[C.23 Oct08] 10th Annual Greater Boston Area Statistical Mechanics Meeting, Brandeis University, Waltham, USA.

[C.22 Jun07] SPCSI, Commissariat à l’Energie Atomique (CEA), Paris, France.

[C.21 Aug06] Center for Soft Matter Research, New York University, USA.

• *‘Structure and dynamics of a uniformly heated granular fluid: How far from equilibrium?’:*

[C.20 Oct08] *Out of equilibrium* – Fall Meeting of the New England Section of the American Physical Society, UMass Boston, USA.

[C.19 May08] New England Granular Workshop, Brandeis University, Waltham, USA.

[C.18 Feb08] Workshop ‘Crystallization and Jamming’, Lorentz Center, Leiden, Holland.

[C.17 Feb07] Physics Department, Univ. of Beureuth, Germany.

[C.16 Dec06] Physics Department, Univ. of Konstanz, Germany.

[C.15 Apr06] MCND, Univ. Manchester, UK.

[C.14 Jan06] IUSTI/IRPHE, Marseille, France.

[C.13 Dec05] SPEC, Commissariat l’Energie Atomique (CEA), Paris, France.

• *‘The unzip instability: oscillatory fracture paths in thin elastic sheets’:*

[C.12 Jan07] Mathematics Dept., Massachusetts Institute of Technology, USA.

[C.11 Nov05] PGP, University of Oslo, Norway.

[C.10 Dec05] Physics Department, Leiden University, Holland.

[C.9 Apr05] Currant Institute, New York University, USA.

[C.8 Apr04] Mathematics Dept., New Jersey Institute of Technology, USA.

[C.7 Mar04] Levich Institute, City College of New York, USA.

• ‘*Gases, liquid and crystals in granular segregation*’:

[C.6 Oct04] PMMH, ESPCI, Paris, France.

[C.5 May04] Mathematics Dept., Massachusetts Institute of Technology, USA.

[C.4 Apr03] Nonlinear Dynamics Group, Univ. of Toronto, Canada.

[C.3 Sep02] MCND, Univ. of Manchester, UK.

[C.2 Aug02] London Mathematical Society Workshop, Lancaster, UK.

• ‘*Patterns in the Sand*’:

[C.1 Dec02] Young Physicists Conference, Institute of Physics, Manchester, UK.

■ CONTRIBUTED TALKS:

[D.16 Jun09] The elasto-pipette: grabbing water with thin elastic sheets, Fluids and Elasticity 2009, Carry-le-Rouet, France.

[D.15 Nov08] ‘*The elasto-pipette: grabbing water with thin elastic sheets*’, Division of Fluids Dynamics of the APS, San Antonio, USA.

[D.14 Mar07] ‘*Anticracks in the venation network of leaves*’, APS March meeting, Denver, USA.

[D.13 Jan07] ‘*Anticracks: localization in the deformation of solid foams under compression*’, Rencontre de Physique Statistique, Paris, France.

[D.12 Nov06] ‘*Caging dynamics in a uniformly heated granular fluid*’, Division of Fluids Dynamics of the APS, Tampa USA.

[D.11 Jul06] ‘*The Unzip Instabilities: straight-to-oscillatory transitions in the tearing of thin elastic sheets*’, 16th European Conference of Fracture, Alexandroupolis, Greece.

[D.10 Feb06] ‘*Dynamics and structure of a uniformly heated granular fluid*’, Rencontre de Physique Statistique, Paris, France.

[D.9 Nov05] ‘*Caging dynamics in a uniformly heated granular fluid*’, Division of Fluids Dynamics of the APS, Chicago, USA.

[D.8 Mar05] ‘*Velocity statistics of a uniformly heated granular fluid*’, APS March meeting, Los Angeles, USA.

[D.7 Feb05] ‘*Velocity statistics of a uniformly heated granular fluid*’, Workshop on Granular Materials in Lunar and Martian Exploration, JFK Space Center, NASA, Orlando, Florida.

[D.6 Mar04] ‘*Oscillatory fracture paths in thin elastic sheets*’, APS March meeting, Montreal, Canada.

[D.5 Sep03] ‘*Gases, liquid and crystals in granular segregation*’, *Transition and flow regimes in granular media* workshop at the *Granular and particle-laden flows* programme, Isaac Newton Institute, Cambridge, UK.

[D.4 Mar03] ‘*Gases, liquid and crystals in granular segregation*’, APS March meeting, Austin, Texas, USA.

[D.3 Dec02] ‘*Dynamics of segregation in granular monolayers*’, GDR Midi workshop on *Granular compaction and slow dynamics*, ESPCI, Paris, France.

[D.2 Jun01] ‘*Coarsening of self-organized clusters due to segregation in a two-component monolayer*

of particles’, at Dynamic Days 2001, Dresden, Germany.

[D.1 Apr00] ‘*Continuum modelling of granular media*’ at the 1st CASM Workshop on Applied Mathematics, Univ. of Cambridge, UK.

■ POSTERS:

[E.8 Nov08] ‘*Capillary origami in nature*’, Division of Fluids Dynamics Meeting of the APS, San Antonio, USA.

[E.7 Jul06] ‘*Caging dynamics of a granular fluid*’, *Gordon Research Conference on Granular and Granular-Fluid Flows*, Queen’s College, Oxford, UK.

[E.6 Jul06] ‘*Velocity Statistics in a uniformly heated granular fluid*’, *Gordon Research Conference on Granular and Granular-Fluid Flows*, Queen’s College, Oxford, UK.

[E.5 Jul06] ‘*Crystallization in a quasi-2D granular fluid*’, *Gordon Research Conference on Granular and Granular-Fluid Flows*, Queen’s College, Oxford, UK.

[E.4 Aug05] ‘*Structure and dynamics in a uniformly heated granular fluid*’, *Gordon Research Conference on Engineering Sciences for Space Exploration*, Les Diablerets, Switzerland.

[E.3 Jul04] ‘*Gases, liquids and crystals in granular segregation*’, *Gordon Research Conference on Granular and Granular-Fluid Flows*, Colby College, MN, USA.

[E.2 Sep02] ‘*Segregation in binary monolayers of dry particles: Entropic ordering in granular media?*’, *Faraday Discussion 123 on Non-Equilibrium behaviour of colloidal dispersions*, Royal Society of Chemistry, University of Edinburgh.

[E.1 Jul02] ‘*Granular segregation in binary shallow layers as a critical phenomena*’, *Gordon Research Conference on Granular and Granular-Fluid Flows*, Holderness School, NH, USA.