

# A.I. (Antonis) Vakis, PhD

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## Address

University of Groningen, FSE  
ENTEG-APE, Room 5115.0303  
Nijenborgh 4, 9747 AG Groningen  
The Netherlands

## Contact

a.vakis@rug.nl  
+31 (0)50 363 4202  
<http://www.rug.nl/staff/a.vakis/>  
<http://vakis.atspace.eu>

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## Positions

- Assistant Professor (Tenure Track) in Advanced Production Engineering (APE) Jan 2013-  
Engineering and Technology Institute Groningen (ENTEG),  
Faculty of Science and Engineering (FSE),  
University of Groningen (UG), Groningen, the Netherlands

*Research* Tribology and lubrication, multiscale contact mechanics, mechanical design, renewable (ocean) energy, biomechanics; published >25 peer-reviewed papers and gave >35 presentations

*Teaching* Course coordinator for Multiscale Contact Mechanics and Tribology (Master) and Computer Aided Design and Manufacturing (Bachelor); contributing FEM content to Materials Science and Engineering course

*Supervision* Supervising and co-supervising 2+2 Postdoctoral researchers and 3+3 PhD students, respectively; graduated 1 PhD student, >20 Master and >20 Bachelor students; number of projects performed in collaboration with industrial partners such as *Philips Drachten*, *Tata Steel Ijmuiden* and *Fuji Electric Malaysia*

*Administration* Industrial Engineering and Management (IEM) Programme (PC) and Evaluation Committees (EC)
- Visiting Professor Sep 2017  
Visiting professor in computational mechanics with experience in molecular dynamics hosted by Prof. M. Paggi in the Multi-Scale Analysis of Materials (MUSAM) lab of the IMT School for Advanced Studies Lucca, Lucca, Italy
- Visiting Researcher (Unsalariated Position) Oct-Dec  
2012  
Preliminary molecular dynamics work in the group of Prof. D.N. Theodorou, Department of Materials Science and Engineering, School of Chemical Engineering, National Technical University of Athens (NTUA), Athens, Greece
- Researcher Sep 2010-  
Aug 2012  
Research towards PhD as an FP7 Young Researchers of Cyprus Program (PENEK) scholar with Prof. C.N. Hadjicostis, Department of Electrical and Computer Engineering (ECE), University of Cyprus (UCy), Nicosia, Cyprus
- Research Assistant Sep 2005-  
Dec 2011  
Research for PhD on nanoscale interface mechanics (Jun 2008-Dec 2011) with Prof. A.A. Polycarpou and MSc on biomechanics (Sep 2005-May 2008) with Prof. X. Zhang, Department of Mechanical Science and Engineering (MechSE), University of Illinois at Urbana-Champaign (Uillinois), Urbana, IL, USA
- Special Scientist Jul-Aug  
2010  
Equipment review and selection for the Controls Laboratory of Prof. C.N. Hadjicostis, Department of Electrical and Computer Engineering, University of Cyprus, Nicosia, Cyprus

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| 7. | <u>Teaching Fellow (Instructor)</u><br>Coordination, design, teaching and grading of required junior-level course<br>Mechanical Design II, Department of Mechanical Science and Engineering,<br>University of Illinois at Urbana-Champaign, Urbana, IL, USA | Jan-Jun<br>2009       |
| 8. | <u>Teaching Assistant</u><br>Teaching CAD/FEM computer labs and fluid laboratory labs, and grading for the<br>Signal Processing course, Department of Mechanical Science and Engineering,<br>University of Illinois at Urbana-Champaign, Urbana, IL, USA    | Sep 2005-<br>Dec 2010 |

## Education

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| 1. | <u>PhD in Mechanical Engineering</u><br>Department of Mechanical Science and Engineering, University of Illinois at<br>Urbana-Champaign, Urbana, IL, USA<br><br><i>Dissertation</i> Nanoscale interface mechanics with application to<br>magnetic storage (Advisor: Prof. A.A. Polycarpou) | Jun 2008-<br>Dec 2011 |
| 2. | <u>MSc in Mechanical Engineering</u><br>Department of Mechanical Science and Engineering, University of Illinois at<br>Urbana-Champaign, Urbana, IL, USA<br><br><i>Thesis</i> Two-dimensional biomechanical analysis of the<br>extremely fast strikes of trap-jaw ant mandibles            | Sep 2005-<br>May 2008 |
| 3. | <u>BSc in Mechanical Engineering (Summa Cum Laude)</u><br>Department of Mechanical and Industrial Engineering (MIE), New Jersey<br>Institute of Technology (NJIT), Newark, NJ, USA<br><br><i>Senior Project</i> Bulk material transporter – Track-stair                                    | Sep 2002-<br>May 2005 |
| 4. | <u>Diploma of Technician Engineer in Mechanical Engineering</u><br>Mechanical and Marine Engineering Department, Higher Technical Institute<br>(HTI), Nicosia, Cyprus<br><br><i>Diploma Project</i> Product visualization techniques with computers  | Sep 1997-<br>Jun 2000 |

## Awards

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### ***Grants, Fellowships and Scholarships***

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| 1. | <u>Visiting Professorship at IMT School for Advanced Studies Lucca: €2,890</u><br>Visiting professor in computational mechanics with experience in molecular<br>dynamics at the IMT School for Advanced Studies Lucca  | Sep 2017 |
| 2. | <u>ITEA3 VMAP Project: €646,400</u><br>Funding for a postdoctoral position to create interoperable definitions for virtual<br>material models in Computer Aided Engineering (CAE), as part of a 32-member<br>consortium across 6 European countries for the ITEA3 proposal “VMAP: A new<br>Interface Standard for Integrated Virtual Material Modelling in Manufacturing<br>Industry” (total budget awarded: ~€16,200,000)<br>Staff: <i>S. Solhjoo</i> | Sep 2017 |
| 3. | <u>Groningen Engineering Center (GEC) Workshop: €1,000</u><br>Funding to organize a workshop within the GEC of the University of Groningen<br>to bring together consortium/network members and new experts on renewable<br>energy for the Ocean Grazer project; in coordination with Prof. B. Jayawardhana   | Jul 2017 |

4. Lorentz Workshop “Micro/Nanoscale Models for Tribology”: €28,530 Apr 2016-  
Feb 2017  
Funding provided by the Lorentz Center (€18,530), the Royal Netherlands Academy of Arts and Sciences (KNAW, €6,000), the Materials Innovation Institute (M2i, €2,000 secured by L. Nicola), the Groningen University Fund (GUF, €1,000) and Nanovea (€1,000) for a workshop Lorentz Center@Oort workshop held in Leiden, the Netherlands (30 Jan to 3 Feb 2017), co-organized with M. Ciavarella, A. Fasolino, L. Nicola, J. Scheibert and V.A. Yastrebov with the participation of some 60 leading tribologists from 12 European countries
5. Northern Netherlands: Region of Smart Factories (RoSF) Project: €138,400 Mar 2016  
Funding for a PhD position on the bonding strength of metal-polymer interfaces shared with Prof. A.H. van den Boogaard of the University of Twente (UT), the Netherlands, as part of a consortium (total budget awarded: ~€21,000,000)  
Staff: *R. Toljaga*
6. zSpace for Enhanced 3D Image Application in Education: €28,400 Sep 2015  
Joint proposal with the University Medical Center Groningen (UMCG) to deploy a 3D desktop tool to enable the visualization of virtual prototypes for education (total budget awarded: ~€85,000)
7. Startup Grant at the University of Groningen: €50,000 Jan 2013  
Standard startup package offered to new tenure-track staff of the Faculty of Science and Engineering; the startup package also includes one 4-year PhD position (total budget awarded: ~€255,000)  
Staff: *S. Solhjo*
8. FP7 Young Researchers of Cyprus Program (PENEK): €69,980 Sep 2010-  
Aug 2012  
Grant funded by the European Commission (FP7) and administered by the Research Promotion Foundation (RPF) of Cyprus between the Universities of Illinois and Cyprus, designed to facilitate the integration of young researchers into European academia
9. Teaching Fellow Award at the University of Illinois: \$2,500 Jan-May  
2009  
Department of Mechanical Science and Engineering Alumni Association fellowship awarded to graduate students to independently teach a course as instructors for one semester
10. Fulbright Cyprus-America Scholarship Program (CASP): \$65,250 Sep 2002-  
May 2005  
Scholarship awarded to Cypriot citizens to study in the USA; used for Bachelor study at the New Jersey Institute of Technology

### **Other Awards**

1. Industrial Engineering and Management (IEM) Teacher of the Year Finalist Jun 2017  
Voted in the top 2 teachers of the IEM program for academic year 2016-17
2. Poster Award (3<sup>rd</sup> place) Oct 2011  
Student Poster Competition at International Joint Tribology Conference (IJTC), Los Angeles, CA, USA
3. Highest Cumulative GPA Award May 2005  
Department of Mechanical and Industrial Engineering, New Jersey Institute of Technology, Newark, NJ, USA
4. Senior Project Award May 2005  
Department of Mechanical and Industrial Engineering, New Jersey Institute of Technology, Newark, NJ, USA

## Publications

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### Google Scholar (Scopus) Citation Report

Citations	218 (159)
h-index	8 (7)

### Peer-Reviewed Journal Articles

1. Müser, M.H., W.B. Dapp, R. Bugnicourt, P. Sainsot, N. Lesaffre, T.A. Lubrecht, B.N.J. Persson, K. Harris, A. Bennett, K. Schulze, S. Rohde, P. Ifju, G.W. Sawyer, T. Angelini, H. Ashtari Esfahani, M. Kadkhodaei, S. Akbarzadeh, J.-J. Wu, G. Vorlauffer, A. Vernes, S. Solhjoo, A.I. Vakis, R.L. Jackson, Y. Xu, J. Streater, A. Rostami, D. Dini, S. Medina, G. Carbone, F. Bottiglione, L. Afferrante, J. Monti, L. Pastewka, M.O. Robbins & J.A. Greenwood, *Meeting the contact-mechanics challenge*, Tribology Letters (IF 1.758), 2017 (In Press)
2. Song, H., A.I. Vakis, X. Liu & E. van der Giessen, *Statistical model of rough surface contact accounting for size dependent plasticity and asperity interaction*, Journal of the Mechanics and Physics of Solids (IF 3.875), 2017, 106, DOI: 10.1016/j.jmps.2017.05.014
3. Solhjoo, S. & A.I. Vakis, *Surface roughness of gold substrates at the nanoscale: an atomistic simulation study*, Tribology International (IF 2.259), 2017, 115, DOI: 10.1016/j.triboint.2017.05.024
4. Wei, Y., J.J. Barradas-Berglind, M. van Rooij, W.A. Prins, B. Jayawardhana & A.I. Vakis, *Investigating the Adaptability of the Multi-Pump Multi-Piston Power Take-Off System for a Novel Wave Energy Converter*, Renewable Energy (IF 3.404), 2017, 111, DOI: 10.1016/j.renene.2017.04.042
5. Solhjoo, S., A.I. Vakis & Y.T. Pei, *Two phenomenological models to predict the single peak flow stress curves up to the peak during hot deformation*, Mechanics of Materials (IF 2.636), 2017, 105, DOI: 10.1016/j.mechmat.2016.12.001
6. Solhjoo, S. & A.I. Vakis, *Continuum mechanics at the atomic scale: Insights into non-adhesive contacts using molecular dynamics simulations*, Journal of Applied Physics (IF 2.101), 2016, 120(21), DOI: 10.1063/1.4967795
7. Vakis, A.I. & J.S. Anagnostopoulos, *Mechanical design and modeling of a single-piston pump for the novel power take-off system of a wave energy converter*, Renewable Energy (IF 3.404), 2016, 96(Part A), DOI:10.1016/j.renene.2016.04.076
8. Solhjoo, S. & A.I. Vakis, *Definition and detection of contact in atomistic simulations*, Computational Materials Science (IF 2.086), 2015, 109, DOI:10.1016/j.commatsci.2015.07.026
9. Solhjoo, S. & A.I. Vakis, *Single asperity nanocontacts: comparison between molecular dynamics simulations and continuum mechanics models*, Computational Materials Science (IF 2.086), 2015, 99, DOI:10.1016/j.commatsci.2014.12.010
10. Chowdhury, S., A.I. Vakis & A.A. Polycarpou, *Optimization of molecularly thin lubricant to improve bearing capacity at the head-disk interface*, Microsystem Technologies (IF 0.974), 2015, 21(7), DOI:10.1007/s00542-014-2364-8

11. Vakis, A.I., *Asperity interaction and substrate deformation in statistical summation models of contact between rough surfaces*, Journal of Applied Mechanics (IF 1.394), 2014, 81(4), DOI:10.1115/1.4025413 &  
  
Song, H., E. van der Giessen & A.I. Vakis, *Erratum: Asperity Interaction and Substrate Deformation in Statistical Summation Models of Contact Between Rough Surfaces [Journal of Applied Mechanics, 2014, 81(4), pp. 041012]*, Journal of Applied Mechanics (IF 1.394), 2016, 83(8), DOI:10.1115/1.4033534
12. Vakis, A.I. & A.A. Polycarpou, *An advanced rough surface continuum-based contact and sliding model in the presence of molecularly thin lubricant*, Tribology Letters (IF 1.758), 2013, 49(1), DOI:10.1007/s11249-012-0060-3
13. Vakis, A.I. & A.A. Polycarpou, *Passive vibration absorption for extremely high density recording*, IEEE Transactions on Magnetics (IF 1.277), 2012, 48(11), DOI:10.1109/TMAG.2012.2195479
14. Vakis, A.I., C.N. Hadjicostis & A.A. Polycarpou, *Three-DOF dynamic model with lubricant contact for thermal fly-height control nanotechnology*, Journal of Physics D: Applied Physics (IF 2.772), 2012, 45(13), DOI:10.1088/0022-3727/45/13/135402
15. Vakis, A.I. & A.A. Polycarpou, *Modeling sliding contact of rough surfaces with molecularly thin lubricants*, Tribology Letters (IF 1.758), 2012, 45(1), DOI:10.1007/s11249-011-9863-x
16. Vakis, A.I., M. Eriten & A.A. Polycarpou, *Modeling bearing and shear forces in molecularly thin lubricants*, Tribology Letters (IF 1.758), 2011, 41(3), DOI:10.1007/s11249-010-9736-8
17. Vakis, A.I. & A.A. Polycarpou, *Head-disk interface nanotribology for Tbit/in<sup>2</sup> recording densities: near-contact and contact recording*, Journal of Physics D: Applied Physics (IF 2.772), 2010, 43(22), DOI:10.1088/0022-3727/43/22/225301
18. Vakis, A.I. & A.A. Polycarpou, *Optimization of thermal fly-height control slider geometry for Tbit/in<sup>2</sup> recording*, Microsystem Technologies (IF 0.974), 2010, 16(6), DOI:10.1007/s00542-010-1081-1
19. Vakis, A.I., S.-C. Lee & A.A. Polycarpou, *Dynamic head-disk interface instabilities with friction for light contact (surfing) recording*, IEEE Transactions on Magnetics (IF 1.277), 2009, 45(11), DOI:10.1109/TMAG.2009.2029410
20. Spagna, J.C., A.I. Vakis, C.A. Schmidt, S.N. Patek, X. Zhang, N.D. Tsutsui & A.V. Suarez, *Phylogeny, scaling, and the generation of extreme forces in trap-jaw ants*, Journal of Experimental Biology (IF 2.914), 2008, 211(14), DOI:10.1242/jeb.015263

### **Peer-Reviewed Conference Papers**

1. Wei, Y., J.J. Barradas-Berglind, M. van Rooij, W.A. Prins, B. Jayawardhana & A.I. Vakis, *A Frequency-Domain Model for a Novel Wave Energy Converter*, EWTEC 2017, Cork, Ireland, 27 August-2 September 2017
2. Barradas-Berglind, J.J., M. Munoz-Arias, Y. Wei, W.A. Prins, A.I. Vakis & B. Jayawardhana, *Towards Ocean Grazer's Modular Power Take-Off System Modelling: a Port-Hamiltonian Approach*, IFAC 2017 World Congress, Toulouse, France, 9-14 July 2017 (Invited paper)
3. Dijkstra, H.T., J.J. Barradas-Berglind, H. Meijer, M. van Rooij, W.A. Prins, A.I. Vakis & B. Jayawardhana, *Revenue Optimization for the Ocean Grazer Wave Energy Converter through Storage Utilization*, RENEW 2016 Conference, Lisbon, Portugal, 24-28 October 2016

4. Barradas-Berglind, J.J., H. Meijer, M. van Rooij, S. Clemente Piñol, B. Galván Garcia, W.A. Prins, [A.I. Vakis](#) & B. Jayawardhana, *Energy Capture Optimization for an Adaptive Wave Energy Converter*, RENEW 2016 Conference, Lisbon, Portugal, 24-28 October 2016
5. Solhjoo, S. & [A.I. Vakis](#), *Molecular dynamics simulations of rough contact with fractal and statistical surface generation*, ASME 2014 12th Biennial Conference on Engineering Systems Design and Analysis (ESDA), Copenhagen, Denmark, 25-27 June 2014, DOI:10.1115/ESDA2014-20107
6. [Vakis, A.I.](#), H. Meijer & W.A. Prins, *First steps in the design and construction of the Ocean Grazer*, ASME 2014 12th Biennial Conference on Engineering Systems Design and Analysis (ESDA), Copenhagen, Denmark, 25-27 June 2014, DOI:10.1115/ESDA2014-20108
7. [Vakis, A.I.](#), S.-C. Lee & A.A. Polycarpou, *Dynamic contact with friction of an ultra-low flying head-disk interface with thermal protrusion*, Asia-Pacific Magnetic Recording Conference (APMRC), Singapore, 14-16 January 2009, DOI:10.1109/APMRC.2009.4925390

### **Conference (Extended) Abstracts**

1. Brenes-Casasola, J., M. Muñoz-Arias, J.J. Barradas-Berglind, W.A. Prins, [A.I. Vakis](#) & B. Jayawardhana, *Energy Extraction Analysis of the Ocean Grazer WEC via Digital Particle Image Velocimetry*, 36<sup>th</sup> Benelux Meeting on Systems and Control, Spa, Belgium, 28-30 March 2017
2. Barradas-Berglind, J.J., M. Muñoz-Arias, Y. Wei, W.A. Prins, [A.I. Vakis](#) & B. Jayawardhana, *Energy-based Modeling of the Ocean Grazer Power Take-off System*, 36<sup>th</sup> Benelux Meeting on Systems and Control, Spa, Belgium, 28-30 March 2017
3. Mokabber, T., P. van Rijn, [A.I. Vakis](#) & Y.T. Pei, *Adhesion of cells on synthesized hydroxyapatite coatings with different morphologies*, Netherlands Society for Biomaterials and Tissue Engineering (NBTE) 25<sup>th</sup> Annual Meeting, Lunteren, the Netherlands, 1-2 December 2016
4. Solhjoo, S. & [A.I. Vakis](#), *The Area of Contact for Non-Adhesive Rough Surfaces: Comparison between MD and Persson's Model*, Multiscale Materials Modelling (MMM) 2016, Dijon, France, 9-14 October 2016
5. Solhjoo, S. & [A.I. Vakis](#), *Lubricated normal and sliding contact of fractal rough surfaces at the atomic scale*, COSTnanoTribo Conference, Istanbul, Turkey, 22-26 June 2015
6. van Rooij, M., H. Meijer, W.A. Prins & [A.I. Vakis](#), *Experimental performance evaluation and validation of dynamical contact models of the Ocean Grazer*, MTS/IEEE Oceans15, Genoa, Italy, 18-21 May 2015, DOI:10.1109/OCEANS-Genova.2015.7271552
7. Solhjoo, S. & [A.I. Vakis](#), *Normal contacts of lubricated fractal rough surfaces at the atomic scale*, TriboUK 2015, Loughborough, UK, 16-17 April 2015
8. [Vakis, A.I.](#), M. Eriten & A.A. Polycarpou, *Molecularly thin lubricant layer contact model accounting for interfacial slip*, ASME/STLE International Joint Tribology Conference (IJTC), San Francisco, CA, 17-20 October 2010, DOI:10.1115/IJTC2010-41249
9. [Vakis, A.I.](#) & A.A. Polycarpou, *Nanoscale mechanics for extremely high density recording*, Hellenic Society for Theoretical and Applied Mechanics (HSTAM) International Congress on Mechanics, Limassol, Cyprus, 12-14 July 2010
10. Zhang, X., K. Li & [A.I. Vakis](#), *Biological inspiration from dynamic modeling of human hand and trap-jaw ant mandible movements*, Journal of Biomechanics (IF 2.431), 2007, 40: p. S79, DOI:10.1016/S0021-9290(07)70076-3

11. Spagna, J.C., S.N. Patek, A.I. Vakis & A.V. Suarez, *Extreme forces and jaw size variation in trap-jaw ants*, Integrative and Comparable Biology, 2006, 46: p. E134-E134

### **Professional Articles**

1. Vakis, A.I. & A.A. Polycarpou, *Dynamic adhesive contact with molecularly thin lubricant at the head-disk interface of hard disk drives*, STLE's Official Membership Magazine, TLT (Tribology & Lubrication Technology), 2012 (Invited paper)

### **Forthcoming**

1. Barradas-Berglind, J.J., H.T. Dijkstra, Y. Wei, M. van Rooij, W.A. Prins, A.I. Vakis & B. Jayawardhana, *Revenue Maximization and Storage Utilization of the Ocean Grazer Wave Energy Converter*, Renewable Energy (IF 3.404), 2017
2. Y. Wei, J.J. Barradas-Berglind, Z. Yu, M. van Rooij, W.A. Prins, B. Jayawardhana & A.I. Vakis, *Frequency-Domain Hydrodynamic Modelling of Dense and Sparse Arrays of Wave Energy Converters*, Renewable Energy (IF 3.404), 2017

### **Presentations**

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#### **Invited Talks**

1. *How education should look like in 2030*, Industrial Engineering and Management (IEM) First Year Symposium, Groningen, the Netherlands, June 2017
2. *Engineering the Ocean Grazer*, Industrial Engineering and Management (IEM) student association TBV Lugus-ENTEG meeting 2017, Groningen, the Netherlands, February 2017
3. *Advanced Production Engineering: Research overview and 3D printing roadmap*, Innovation Cluster Drachten (ICD), Drachten, the Netherlands, May 2016
4. *Tribology across scales as a bridge between science and engineering*, Engineering and Technology Institute Groningen Seminar Series, Faculty of Science and Engineering, University of Groningen, Groningen, the Netherlands, April 2015
5. *Design, analysis and optimization of the core technology for a novel wave energy converter*, Department of Mechanical and Manufacturing Engineering, University of Cyprus, Nicosia, Cyprus, January 2015
6. *Multi-scale tribology: from nanocontacts to wave energy harvesters*, Precision and Microsystems Engineering (PME) Department, Faculty of Mechanical, Maritime and Materials Engineering (3ME), Technical University Delft, Delft, the Netherlands, December 2014
7. *Modeling rough contact in the presence of molecularly thin lubricant films*, Department of Materials Science and Engineering, National Technical University of Athens, Athens, Greece, November 2012
8. *Multiscale interface mechanics and its applications*, Mechanical Engineering Department, Khalifa University, Abu Dhabi, UAE, September 2012
9. *Design and analysis of dynamical interfaces at the nanoscale*, Institute of Technology and Management, University of Groningen, Groningen, the Netherlands, June 2012
10. *Interface mechanics and dynamics in nanotechnology*, Mechanical Engineering Department, McGill University, Montreal, Canada, May 2012

11. *Passive vibration absorption for extremely high density recording*, Dynamics Interest Group (DIG) Seminar, Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, May 2012

### **Conference and Other Talks**

1. Presented by J.J. Barradas-Berglind: *Towards Ocean Grazer's Modular Power Take-Off System Modelling: a Port-Hamiltonian Approach*, IFAC 2017 World Congress, Toulouse, France, 9-14 July 2017
2. Presented by J.J. Barradas-Berglind: *Energy Extraction Analysis of the Ocean Grazer WEC via Digital Particle Image Velocimetry*, 36th Benelux Meeting on Systems and Control, Spa, Belgium, March 2017
3. Presented by J.J. Barradas-Berglind: *Energy-based Modeling of the Ocean Grazer Power Take-off System*, 36th Benelux Meeting on Systems and Control, Spa, Belgium, March 2017
4. Presented by T. Mokabber: *Adhesion of cells on synthesized hydroxyapatite coatings with different morphologies*, NBTE Annual Meeting, Lunteren, the Netherlands, December 2016
5. Presented by J.J. Barradas-Berglind: *Revenue Optimization for the Ocean Grazer WEC through Storage Utilization*, RENEW 2016, Lisbon, Portugal, October 2016
6. Presented by J.J. Barradas-Berglind: *Energy Capture Optimization for an Adaptive Wave Energy Converter*, RENEW 2016, Lisbon, Portugal, October 2016
7. Presented by S. Solhjo: *The Area of Contact for Non-Adhesive Rough Surfaces: Comparison between MD and Persson's Model*, MMM 2016, Dijon, France, October 2016
8. Presented by S. Solhjo: *Nanotribology: Molecular Dynamics Simulation Approach*, ENTEG Autumn Meeting 2015, Haren, the Netherlands, October 2015
9. Presented by S. Solhjo: *Lubricated normal and sliding contact of fractal rough surfaces at the atomic scale*, COSTnanoTribo Conference, Istanbul, Turkey, June 2015
10. *Experimental performance evaluation and validation of dynamical contact models of the Ocean Grazer*, MTS/IEEE Oceans15, Genoa, Italy, May 2015
11. Presented by S. Solhjo: *Normal contacts of lubricated fractal rough surfaces at the atomic scale*, TriboUK 2015, Loughborough, UK, April 2015
12. *First steps in the design and construction of the Ocean Grazer*, ASME 2014 12th Biennial Conference on Engineering Systems Design and Analysis (ESDA), Copenhagen, Denmark, June 2014
13. *Molecular dynamics simulation of rough contact with fractal and statistical surface generation*, ASME 2014 12th Biennial Conference on Engineering Systems Design and Analysis (ESDA), Copenhagen, Denmark, June 2014
14. *Modeling asperity interaction*, DPTA/SMS group presentation, University of Groningen, Groningen, the Netherlands, May 2013
15. *Nanoscale modeling of hard disk drive design for ultrahigh recording densities*, University of Cyprus, Nicosia, Cyprus, July 2012
16. *Sliding contact between rough surfaces in the presence of molecularly thin lubricant layers*, Surface Science and Technology, Department of Materials, ETH Zürich, Switzerland, December 2011



17. *Nanoscale interface mechanics with application to magnetic storage*, Institute of Robotics and Intelligent Systems (IRIS), ETH Zürich, Switzerland, December 2011
18. *Rough surface sliding contact in the presence of molecularly thin lubricant*, ASME/STLE International Joint Tribology Conference (IJTC), Los Angeles, CA, October 2011
19. *Molecularly thin lubricant layer contact model accounting for interfacial slip*, ASME/STLE International Joint Tribology Conference, San Francisco, CA, October 2010
20. *Modeling molecularly thin lubricant forces at the head-disk interface*, Information Storage Industry Consortium (INSIC) Annual Meeting, EHDR Program, Milpitas, CA, August 2010
21. *Tribodynamics of extremely high density recording*, Recruiting Presentation at the University of Illinois at Urbana-Champaign, Urbana, IL, March 2010
22. *Tbit/in<sup>2</sup> recording densities in magnetic storage: issues at the head-disk interface*, Nanohour Series at the Beckman Institute, University of Illinois at Urbana-Champaign, Urbana, IL, January 2010
23. *Optimization of TFC slider geometry and the effect of disk deformations due to air bearing stiffening during flight*, Information Storage Industry Consortium Annual Meeting, EHDR Program, Santa Clara, CA, August 2009
24. *Towards 10 Tbit/in<sup>2</sup> of storage density: optimization of HDD design with respect to TFC geometry for flying and surfing recording*, University of Cyprus, Nicosia, Cyprus, June 2009

### **Posters**

1. Presented by S. Solhjoo: *Atomic scale roughness of gold substrates*, Lorentz workshop on Micro/Nanoscale Models for Tribology, Leiden, then Netherlands, January 2017
2. Presented by S. Solhjoo: *Continuum contact mechanics theories at the atomic scale: an investigation of non-adhesive contacts*, Lorentz workshop on Micro/Nanoscale Models for Tribology, Leiden, then Netherlands, January 2017
3. Presented by J. Li: *Prediction of solubility for thermo-responsive comb polymers*, ENTEG Autumn Meeting 2016, Haren, the Netherlands, October 2016
4. Presented by T. Mokabber: *Synthesizing hydroxyapatite coatings for medical applications*, ENTEG Autumn Meeting 2016, Haren, the Netherlands, October 2016
5. Presented by S. Solhjoo: *Non-adhesive contacts: the application of continuum theories at the atomic scale*, ENTEG Autumn Meeting 2016, Haren, the Netherlands, October 2016
6. Presented by R. Toljaga: *Bonding strength of deforming metal-polymer interfaces*, ENTEG Autumn Meeting 2016, Haren, the Netherlands, October 2016
7. Presented by S. Solhjoo: *Nanotribology: Molecular Dynamics Simulation Approach*, ENTEG Autumn Meeting 2015, Haren, the Netherlands, October 2015
8. Presented by S. Solhjoo: *Dry sliding contact between fractal and statistical rough surfaces at the atomic scale*, FOM@Veldhoven, Veldhoven, the Netherlands, January 2015 &  
DGM European Symposium on Friction, Wear and Wear Protection, Karlsruhe, Germany, May 2014
9. *Passive vibration absorption for extremely high density recording*, IEEE International Magnetism Conference (INTERMAG), Vancouver, Canada, May 2012

10. *3-DOF model of magnetic storage head-disk interface for use with adhesive contact model with friction*, ASME/STLE International Joint Tribology Conference, Los Angeles, CA, October 2011
11. *Modeling molecularly thin lubricant forces in magnetic storage*, ASME/STLE International Joint Tribology Conference, San Francisco, CA, October 2010
12. *Assessment of dynamic contact conditions and optimization of TFC slider geometry for Tbit/in<sup>2</sup> recording densities*, ASME/STLE International Joint Tribology Conference, Memphis, TN, October 2009

## Teaching

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### Master Courses

1. Multiscale Contact Mechanics and Tribology Feb 2015-  
Course coordinator and lecturer of elective course in the Industrial Engineering and Management (IEM) Advanced Production Engineering (APE) specialization

### Bachelor Courses

1. Computer Aided Design and Manufacturing (CAD/CAM) Nov 2013-  
Course coordinator and lecturer of compulsory 3<sup>rd</sup> year course for the IEM Production Technology and Logistics (PTL) track
2. Materials Science and Engineering (Course coordinator: Prof. B.J. Kooi) Oct 2013-  
Lecturer of Finite Element Method (FEM) content of compulsory 2<sup>nd</sup> year course for the IEM PTL track

## Supervision

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The following industrial partners have participated in past and ongoing PhD and Master projects: *Philips Drachten, Tata Steel Ijmuiden, Thales Netherlands, BD Kiestra, Leapfrog 3D Printers, Henkel Nederland B.V. and Fuji Electric Malaysia*

### Postdoc Projects

1. S. Solhjo  
*A new Interface Standard for Integrated Virtual Material Modelling in Manufacturing Industry* Oct 2017-  
Postdoc project funded via RvO ITEA3 “VMAP” proposal
2. Y. Wei Jun 2016-  
*Hydrodynamics of the Ocean Grazer*  
Postdoc project funded by the University of Groningen

### Postdoc Project Co-supervision

1. A. Kumat (Main supervisor: Prof. Y.T. Pei) Aug 2017-  
*Laser Additive Manufacturing of Conformal Cooling Systems*  
Postdoc project funded via STW HTM “ProTOcool” proposal
2. J.J. Barradas-Berglind (Main supervisor: Prof. B. Jayawardhana) Dec 2015-  
*Mechatronics of the Ocean Grazer*  
Postdoc project funded by the University of Groningen

### **PhD Projects**

1. R. Wang (Promotor: Prof. B. Jayawardhana) Jun 2017-  
*Design and optimization of the Ocean Grazer platform*  
PhD project funded by a full scholarship from the University of Groningen
2. R. Toljaga (Promotor: Prof. A.H. van den Boogaard, University of Twente) Sep 2016-  
*Bonding strength of deforming metal-polymer interfaces*  
PhD project funded via SNN “Region of Smart Factories (RoSF)” proposal
3. J. Li (Promotor: Prof. F. Picchioni) Oct 2015-  
*Modeling of thermally reversible interactions in polymeric systems*  
PhD project funded by the Chinese Scholarship Council (CSC)
4. S. Solhjoo (Promotor: Prof. Y.T. Pei) Sep 2013-  
*Nanotribology investigations with classical molecular dynamics* Jul 2017  
PhD project funded by the University of Groningen

### **PhD Project Co-supervision**

1. M. Guo (Promotor: Prof. B. Jayawardhana) Oct 2017-  
*Control system of a novel coupling mechanism for the Ocean Grazer Power Take-Off system*  
PhD project funded by the Chinese Scholarship Council (CSC)
2. M.Z. Almuzakki (Promotor: Prof. B. Jayawardhana) Oct 2016-  
*Dynamical modeling and optimal distributed control design of the Ocean Grazer's floater blanket*  
PhD project funded by the Indonesia Endowment Fund for Education
3. T. Mokabber (Promotor: Prof. Y.T. Pei; co-promotor: Assist. Prof. P. van Rijn) Oct 2015-  
*Synthesizing antibacterial hydroxyapatite coatings for medical applications*

### **PhD Committee Participation**

1. H. Song (Examining Committee; promotor: Prof. E. van der Giessen, ZIAM) Nov 2016  
*Size-dependent plasticity in contact/friction: from discrete dislocation dynamics inside an asperity to statistical summation over asperities*

### **Master Research Projects**

1. M. Kamps Oct 2016-  
*Molecular dynamics simulation of polymeric flow on atomically flat and rough surfaces* Jul 2017
2. A. van Driel Oct 2016-  
*Development of the activation mechanism for the Ocean Grazer* Jun 2017
3. R.J.M. Zwetsloot Oct 2016-  
*Hydrodynamical analysis of the Ocean Grazer platform* Jun 2017
4. Z. Yu Oct 2016-  
*Hydrodynamic analysis of the floater blanket in the frequency domain* Apr 2017
5. O.J. Strack van Schijndel Oct 2016-  
*Visualization of mechanical constraints of the Antikythera Mechanism* Apr 2017
6. P. Begemann Oct 2016-  
*Validation of a simulation model for ductile fracture* Apr 2017

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| 7.  | J.N.B. Huisman<br><i>The effect of crystal structure on surface roughness at the nanoscale</i>  | Mar 2016-<br>Feb 2017 |
| 8.  | O. van Hees<br><i>The design of a sealing system for the Ocean Grazer</i>   | Oct 2015-<br>Jul 2016 |
| 9.  | M.R. Hegge<br><i>The redesign of the transportation track within the Total Lab Automation system of BD Kiestra</i>                          | Sep 2015-<br>Jul 2016 |
| 10. | M.A. Hassink<br><i>Design of experimental measurements to obtain performance characteristics of a multiple ball check valve</i>             | Oct 2015-<br>Jun 2016 |
| 11. | P.J. Halbertsma<br><i>Free surface roughening due to multi-stage cold forming</i>   | Oct 2015-<br>Apr 2016 |
| 12. | H.J. Houtsma<br><i>Design of a station keeping system for the Ocean Grazer</i>  | Dec 2014-<br>Dec 2015 |
| 13. | R.W. de Groene<br><i>Friction experiments and simulations to model the hot forging process at Henkel Scheemda</i>                           | Feb 2015-<br>Sep 2015 |
| 14. | D. ter Veen<br><i>Optimization of 3D printing for the APE group</i>   | Sep 2014-<br>Jun 2015 |
| 15. | L.J.P. Evers<br><i>Designing a transmission system for the Ocean Grazer</i>   | Sep 2014-<br>May 2015 |
| 16. | A. Cruz Gispert (Erasmus)<br><i>Analysis and dynamical modeling of a piston valve for a wave energy converter</i>                           | Sep 2014-<br>Apr 2015 |
| 17. | B. Ammerlaan<br><i>The effect of media substrate topography on the carbon coating coverage: a Molecular Dynamics study at Fuji Electric</i> | Jan 2014-<br>Mar 2015 |
| 18. | M. van Rooij<br><i>Experimental validation of dynamical contact models of the Ocean Grazer</i>  | Mar 2014-<br>Feb 2015 |
| 19. | H. Meijer<br><i>Simulation of a piston-type hydraulic pump for the Ocean Grazer</i>   | Sep 2013-<br>Dec 2014 |
| 20. | E.J. Heslinga<br><i>Evaluating lubricant pick-up testing methods for media disks at Fuji Electric Malaysia</i>                              | Apr 2013-<br>Oct 2014 |

**Master Research Project Co-supervision**

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|----|---|-----------------------|
| 1. | A.S. Ratum (First supervisor: Prof. B. Jayawardhana)<br><i>Dynamical modeling and control of the Ocean Grazer WEC turbine subsystem</i> | Oct 2016-<br>Jul 2017 |
| 2. | P. Papangelos (First supervisor: Prof. B. Jayawardhana)<br><i>2D force measurement on a bicycle ergometer</i>                           | Apr 2015-<br>Jun 2017 |
| 3. | W. van Zanten (First supervisor: dr. A.A. Geertsema)<br><i>The Antikythera Mechanism</i>  | Mar 2016-<br>Apr 2017 |

4. J. Franke (First supervisor: Prof. E.J. Stamhuis, ESRIG) Sep 2015-  
Mar 2017  
*An experimental approach to create an efficient and non-clogging solid-liquid separation method using biomimetics*
5. N. Schriever (First supervisor: Prof. Y.T. Pei) Mar 2016-  
Jan 2017  
*Nanoporous materials for sulfur-based cathodes of high-energy-density lithium-sulfur batteries*
6. C. Verhoef (First supervisor: Prof. B. Jayawardhana) Oct 2015-  
Sep 2016  
*Estimating and predicting the ocean surface with radar data*
7. W. Wierenga (First supervisor: Prof. J. Post) Nov 2015-  
Jul 2016  
*Evaluation of the MSC Adams co-simulation interface for metal working processes*
8. H.T. Dijkstra (First supervisor: Prof. B. Jayawardhana) Oct 2015-  
Jul 2016  
*Maximizing revenue of electricity generated by the Ocean Grazer*
9. E. Heidstra (First supervisor: Prof. Y.T. Pei) Oct 2015-  
Apr 2016  
*Improving the filament extrusion performance and reliability of the Leapfrog Creatr Pro 3D printer*
10. S. Clemente Piñol (Erasmus; first supervisor: Prof. B. Jayawardhana) Sep 2014-  
May 2015  
*Dynamical modeling, analysis and optimization of a floater blanket*
11. D.A. Botterweg (First supervisor: Prof. Y.T. Pei) Mar 2014-  
Feb 2015  
*The design of a check valve for the Ocean Grazer*
12. B. Galván García (Erasmus; first supervisor: Prof. B. Jayawardhana) Mar 2014-  
Aug 2014  
*Nonlinear control design for a wave energy converter*

#### **Other Master Projects (Business, Design, etc.)**

1. K. van Ek (Science, Business and Policy; first supervisor: dr. J. Kosinka, JBI) Feb 2017-  
Jul 2017  
*Single-material 3D printed objects with varying flexibility*
2. E.M. de Ruitter (IEM Design Project; first supervisor: dr. H. Kloosterman) Nov 2016-  
Mar 2017  
*Improving the campaign life of the pot hardware in the continuous galvanizing lines at Tata Steel IJmuiden*
3. B.J.D. Hallo (IEM Business Project) May 2015-  
Oct 2015  
*Feasibility study of small-scale production of filament for 3D printing*

#### **Bachelor Projects**

1. R. Bos Feb 2017-  
Jun 2017  
*The Ocean Grazer floater blanket as an inflatable mattress concept*
2. A. Miocevic Feb 2017-  
Jun 2017  
*Ocean Grazer: external platform structure*
3. J.P. Nienhuis Feb 2017-  
Jun 2017  
*Preliminary study on modelling interfacial behavior in a metal-polymer interface using COMSOL Multiphysics*
4. N. de Vries Feb 2017-  
Jun 2017  
*Interactive 3D models via Unity for education*

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| 5.  | J.E. Bos<br><i>The Antikythera mechanism – From the sea to 3D: Virtual Greek astronomy and engineering</i>  | Feb 2017-<br>Jun 2017 |
| 6.  | M.J.J Bögels<br><i>Validating floater blanket models for the Ocean Grazer</i>   | Sep 2016-<br>Jan 2017 |
| 7.  | R.M. Nienhuis<br><i>The Antikythera mechanism: using the past to shape the future</i>   | Sep 2016-<br>Jan 2017 |
| 8.  | S. Vreriks<br><i>Empirical research on multi-chamber Oscillating Water Columns</i>  | Feb 2016-<br>Jun 2016 |
| 9.  | M.R.A. Visser<br><i>Wave tank experiments on the prototype of the floater blanket</i>   | Feb 2016-<br>Jun 2016 |
| 10. | P. van den Berg<br><i>Optimal turbine for a varying head and flow in the Ocean Grazer</i>   | Feb 2016-<br>Jun 2016 |
| 11. | R. Zaharia<br><i>Added value of an Oscillating Water Column</i>   | Sep 2015-<br>Jan 2016 |
| 12. | S. Gupta (Erasmus)<br><i>A feasibility study of the application of a piston ring system for the piston-type hydraulic pump system in the Ocean Grazer</i> | Aug-Dec<br>2015       |
| 13. | T. Herwig<br><i>Creating a structural design for the floater elements for the Ocean Grazer</i>  | Feb 2015-<br>Jun 2015 |
| 14. | N. Hartsuiker<br><i>Conversion of hydraulic head into electrical energy in the Ocean Grazer</i>   | Feb 2015-<br>Jun 2015 |
| 15. | O.J. Strack van Schijndel<br><i>Determining the amount of floater members of the Ocean Grazer</i>   | Feb 2015-<br>Jun 2015 |
| 16. | J.S. van der Molen<br><i>Creating a better data management system for the Ocean Grazer group</i>  | Feb 2015-<br>Jun 2015 |
| 17. | W. van Zanter<br><i>Researching the floater-piston connection of the Ocean Grazer</i>   | Sep 2014-<br>Jan 2015 |
| 18. | M. Kamps<br><i>Validating a surface roughness model using FEM</i>   | Sep 2014-<br>Jan 2015 |
| 19. | J. Welink<br><i>Creating a scale model for the Ocean Grazer</i>   | Feb-Jul<br>2014       |
| 20. | W. Wierenga<br><i>Designing and testing a nonlinear energy sink applied to the Ocean Grazer</i>   | Feb-Jul<br>2014       |

### **Bachelor Project Co-supervision**

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|----|--|-----------------------|
| 1. | R. Popa (Astronomy; first supervisor: M.A.M. van den Weijgaert, Kapteyn)<br><i>Visualization of the Antikythera Mechanisms's Planetarium</i> | Mar 2017-<br>Jul 2017 |
| 2. | F. Kernkamp (Applied Physics; first Supervisor: P. Onck, ZIAM)<br><i>Contact modelling of patterned liquid crystal polymer coatings</i>      | Aug 2015-<br>May 2016 |

## Membership and Service

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### ***Professional Societies***

1. IEEE, the Institute of Electrical and Electronics Engineers
2. STLE, the Society of Tribologists and Lubrication Engineers
3. ASME, the American Society of Mechanical Engineers
4. EOTEK, the Scientific and Technical Chamber of Cyprus
5. Tau Beta Pi (NJ Gamma), the National Engineering Honor Society
6. Pi Tau Sigma (Tau Theta), the International Mechanical Engineering Honor Society

### ***Academic Service***

1. Chair of Industrial Engineering and Management (IEM) Programme Committee (PC) at the University of Groningen Sep 2016-
2. Co-organizer and co-chair with M. Ciavarella, A. Fasolino, L. Nicola, J. Scheibert and V.A. Yastrebov of a Lorentz Workshop on “Micro/Nanoscale Models for Tribology” held in Leiden, the Netherlands, from 30 January to 3 February 2017 Apr 2016-  
Feb 2017
3. Member of Industrial Engineering and Management (IEM) Programme Committee’s Evaluation Committee (EC) at the University of Groningen Sep 2014-  
Jul 2016
4. Teacher of workshop on Computer Aided Design for Cover, the Student Association of Computing Science and Artificial Intelligence at University of Groningen Sep 2014
5. Co-organizer and co-administrator (with Drs. W.A. Prins) of the Ocean Grazer Group comprising staff members and students working on the Ocean Grazer project at the University of Groningen Sep 2014-
6. Reviewer for the National Research Foundation of South Africa Aug 2014
7. Supervisor of student groups performing literature research for Industrial Engineering and Management Integrated Design Project, a compulsory 1<sup>st</sup> year course in the IEM Production Technology and Logistics (PTL) track Apr 2014-
8. Member of Industrial Engineering and Management (IEM) Programme Committee (PC) at the University of Groningen Sep 2013-  
Jul 2016
9. Organizer of seminar series on magnetic storage tribology at the Electrical and Computer Engineering Department of the University of Cyprus as part of the requirements for the PENEK grant Jun 2012
10. Reviewer for a number of journals in the fields of: Sep 2009-
  - › Tribology and lubrication (Tribology International, Tribology Letters, Journal of Tribology, Journal of Engineering Tribology, Tribology Transactions);
  - › Applied mechanics, materials science and applied physics (Journal of Applied Mechanics, Meccanica, Computational Materials Science, International Journal of Solids and Structures, Journal of Adhesion Science and Technology, Journal of Applied Physics);
  - › Manufacturing and mechanical engineering (Journal of Micro- and Nano-Manufacturing, International Journal of Precision Engineering and

- › Manufacturing-Green Technology, Journal of Hydraulic Engineering); and
- › Renewable energy (Ocean Engineering)