

Professor Gennady Mishuris MSc PhD DSc PB FLSW

Professor Mishuris holds a personal chair in the Mathematical Modelling of Structures, Solids and Fluids Group in Department of Mathematics at Aberystwyth University. He is an internationally renowned expert in areas of Wiener-Hopf techniques, factorisation of matrix-functions, singular integral equations, mathematical modelling of fracture in continuous and discrete structures, micromechanics and fracture of composite materials, fluid – solid interactions (hydrofracturing, Hele-Shaw flow, CO₂ sequestration, geothermal engineering), biomechanics (mathematical modelling of articular cartilage, contact and indentation problems in mechanics and biomechanics), applications to plasticity, viscoplasticity etc.

Degrees:

- DSc in Mechanics (habilitation), Krakow University of Technology, Krakow, Poland. 1999.
- PhD in Applied Mathematics, St. Petersburg State University, Russia, (Leningrad, USSR), 1985.
- MSc (with distinction) in Applied Mathematics, St. Petersburg State University, Russia, 1982.

Awards and Fellowships

- Ser Cymru Future Generations Industrial Fellowship, 2020.
- *Distinguished Visiting Professor* at University of Modena (Italy), 2019; University of Trento (Italy), 2018; Skolkovo Institute of Science and Technology (Moscow, Russia), 2018.
- Royal Society Wolfson Research Merit Award, 2016.
- Fellow of the Learned Society of Wales, 2014.
- Belvedere Professorship awarded by the President of Republic of Poland, April, 2011.
- Marie Curie Fellowship (University of Liverpool, UK), 2005-2007.
- Leverhulme Trust Visiting Fellowship (LSBU, UK), 2004.
- Alexander von Humboldt Fellowship (Erlangen-Nuremberg University, Germany), 2000-2001.
- Prize of Polish Ministry of Education for Scientific Research (Poland), 2000.
- Polish-Russian Scientific Fellowship, (Warsaw, Poland), 1991-1992.

Visiting Positions

Tel-Aviv University (Israel, 2018); University of Trento (Italy, 2014, 2010); University of Cagliari (Italy, 2016, 2013); University of Liverpool (2007-2013); Rzeszow University of Technology (Poland, 2005-2010); University of Pachuca, (Mexico, 2010); Aveiro University (Portugal, 2006-2007); University of Maribor (Slovenia, 2003)

Professional memberships

London Mathematical Society (LMS), American Mathematical Society (AMS), Polish Math Society (PTM), European Society of Biomechanics, EUROMECH, GAMM, Polish Group of Fracture Mechanics, ISSAC, ISIMM (International Society for the Interaction of Mechanics and Mathematics).

Professional activities

- Member of Peer Review UKRI College in Future Leaders Fellowships (FLF) Scheme (from 2018)
- Member of the Nomination Committee of the Learned Society of Wales (from 2017)
- Member of the Research Committee of the Wales Institute of Mathematical and Computational Sciences (WIMCS), (from 2007 to 2015)
- Member of the Steering Committee of WIMCS Computational Modelling Cluster (from 2007-2015)
- Member of the Steering Committee of the Health Modelling Centre Cymru (hmc²) (from 2009)
- Co-coordinator of the WIMCS Computational Modelling Cluster (from 2009 to 2015)
- Institute ERASMUS coordinator and Director of International Relationship (from 2007)

Editorial Board Member (academic journals)

Mathematics and Mechanics of Solids (from 2020); *Proceeding of the Royal Society of London A* (from 2017); *International Journal of Engineering Sciences* (from 2016); *Acta Mechanica et Automatica* (from 2015).

Invited co-editor for special issues

- “Wiener-Hopf method and related techniques” (Proceedings of Royal Society, Series A, 2020)
- “Modelling of dynamic phenomena and localisation in structured media of materials”, Part I, Part II (Philosophical Transaction of Royal Society, Series A, 2019)
- “Advances in micromechanics of materials” (Acta Mechanica, 2015)
- “Modeling of Hydraulic Fractures” (Computers and Geotechnics, 2015)

From his appointment as WIMCS Professor at AU, he has secured essential research funding from the EU Commission (10 projects, more than 14 mln Euros) with near 4 mln for AU, the largest ones are

H2020 MSCA RISE: (EffectFact-101008140, 2021-2024, Coordinator; MATRIXASSAY-644175, 2015-2019), FP7 PEOPLE MC IRSES ([TAMER-610547](#), 2014-2018, Coordinator), ITN ([CERMAT2-606878](#), 2013-2017), IAAP ([PARM2-284544](#), 2012-2016, Coordinator; [INTERCER2-286110](#), 2011-2016, Coordinator; [HYDROFRAC-251475](#), 2010-2014, Coordinator).

PI on various grants funded by EU Commission, and UK funding bodies (WEFO, LMS, RS, British Council, etc.).

Teaching area: Ordinary Differential Equations, Partial Differential Equations, Asymptotic Methods in Mechanics, Theory of Elasticity, Advanced Mathematical Methods in Elasticity, Integral Transforms, Advanced Methods for Integral Equations, Numerical Methods in PDEs.

Organisation of major scientific events:

- BIRS Workshop (co-coordinator) “Cross-Fertilisation of ideas from the Riemann–Hilbert Technique and the Wiener–Hopf Method”, (2022); jointly by Banff International Research Station for Mathematical Innovation and Discovery (USA) & the Institute for Advanced Study in Mathematics (China), Sept. 2022.
- INI Workshop “WHT” (co-coordinator) “Bringing pure and applied analysis together via the Wiener-Hopf technique, its generalisations and applications” (2019); Isaac Newton Institute for Mathematical Sciences
- International Conferences: *Advances in Micromechanics of Materials* (2014); *Recent Advances in Numerical Simulation of Hydraulic Fracture* (2014); 8th Int. Symposium on Mechanics of Materials and Structures”, “Fracture and Fragmentation Technologies in Science and Engineering” (2015)
- Workshops: *Wiener-Hopf Method and its applications* (Aberystwyth, 2010, 2012, Aveiro 2014)
- Mini-symposia: *Recent advances in mathematical and numerical modelling in hydraulic fracture* (St. Petersburg, 2013, 2014, 2016, Madrid 2015, Cardiff 2014); *Wiener-Hopf Method and its applications* (Cardiff 2014, Padova 2016)
- Summer Schools: *First Summer School on Micromechanics*, Bezmiechowa, Poland (2015); *Mathematical Modelling in Solids and Structures*, Aberystwyth (2015).

Dissemination activity:

Professor Mishuris has written four research monographs, six textbooks, more than 200 papers. He has been invited to speak at various scientific events, for example, recently at “*Fracture in solid mechanics: mathematical and physical aspects*” (Sorbonne, Paris; 2019), INI Programmes: “*Mathematics of sea ice phenomena*”, (Cambridge, 2017), “*Complex analysis: techniques, applications and computations*”, (Cambridge, 2019) and “*Advances in Mechanics of Solids and Structures*” (Trento, 2019).

List of 10 Publications

- 1) Mishuris, G. S., Movchan, A. B., & Slepian, L. I. (2009). Localised knife waves in a structured interface. *Journal of the Mechanics and Physics of Solids*, 57(12), 1958-1979.
- 2) Mishuris, G., Wrobel, M., & Linkov, A. (2012). On modeling hydraulic fracture in proper variables: stiffness, accuracy, sensitivity. *International Journal of Engineering Science*, 61, 10-23.
- 3) Piccolroaz, A., Mishuris, G., & Movchan, A. B. (2009). Symmetric and skew-symmetric weight functions in 2D perturbation models for semi-infinite interfacial cracks. *Journal of the Mechanics and Physics of Solids*, 57(9), 1657-1682.
- 4) Rogosin, S., & Mishuris, G. (2016). Constructive methods for factorization of matrix-functions. *IMA Journal of Applied Mathematics*, 81(2), 365-391.

- 5) Wrobel, M., & Mishuris, G. (2015). Hydraulic fracture revisited: Particle velocity based simulation. *International Journal of Engineering Science*, 94, 23-58.
- 6) Argatov, I., & Mishuris, G. (2016). *Contact mechanics of articular cartilage layers*. SPRINGER INTERNATIONAL PU.
- 7) Öchsner, A., Stasiek, M., Mishuris, G., & Grácio, J. (2007). A new evaluation procedure for the butt-joint test of adhesive technology: Determination of the complete set of linear elastic constants. *International journal of adhesion and adhesives*, 27(8), 703-711.
- 8) Mishuris, G., Piccolroaz, A., & Radi, E. (2012). Steady-state propagation of a Mode III crack in couple stress elastic materials. *International Journal of Engineering Science*, 61, 112-128.
- 9) Alexandrov, S., Mishuris, G., Miszuris, W., & Sliwa, R. E. (2001). On the dead-zone formation and limit analysis in axially symmetric extrusion. *International journal of mechanical sciences*, 43(2), 367-379.
- 10) Alexandrov, S., & Mishuris, G. (2009). Qualitative behaviour of viscoplastic solutions in the vicinity of maximum-friction surfaces. *Journal of Engineering Mathematics*, 65(2), 143-156.

