

# Andrei G. Shvarts

## Curriculum Vitae

### Research interests

○ Contact mechanics ○ Computational tribology ○ Fracture mechanics ○ Data-driven mechanics ○ Multi-physical coupling ○ Mixed finite elements ○ Research software development ○ High-performance computing

### Education

- Jan 2022 – **PGCert in Academic Practice (PGCAP)**, *with distinction*  
May 2023 *University of Glasgow, Glasgow, UK*  
Part of the Early Career Development Programme, designed to support the professional development of staff involved in teaching and supporting learning in Higher Education
- Oct 2015 – **PhD in Computational Mechanics**, *PSL University, MINES ParisTech, Centre des Matériaux, Évry, France*  
Mar 2019  
Thesis: *Coupling mechanical frictional contact with interfacial fluid flow at small and large scales* [[tel-02396951](tel:02396951)]  
Scientific advisers: Dr Vladislav A. Yastrebov, Prof Georges Cailletaud (*MINES ParisTech*)  
Industrial supervisor: Dr Julien Vignollet (*Safran Tech*)
- Development of a monolithic finite-element framework for simulating thin fluid flow in contact interfaces between solids with rough surfaces;
  - Implementation in non-linear material & structure analysis suite [Z-set](#);
  - Simulation-assisted derivation of a refined law of the rough contact interface permeability;
  - Lecturer/tutor for various graduate courses
- Sep 2012 – **MSc in Applied Mathematics and Computer Science**, *with distinction*  
Jun 2014 *Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia*  
Thesis: *Bulk strain solitons in nonlinearly elastic thin-walled cylindrical shells*  
Scientific adviser: Prof Alexander M. Samsonov (*Ioffe Institute*)
- Sep 2008 – **BSc in Applied Mathematics and Computer Science**, *with distinction*  
Jun 2012 *Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia*  
Thesis: *Analytical and numerical solution of the Cauchy problem for the Jeffreys-type equation*  
Scientific adviser: Dr Sergey A. Rukolaine (*Ioffe Institute*)

### Professional experience

- July 2021 – **Lecturer in Computational Mechanics**, *University of Glasgow, James Watt School of Engineering (JWSoE), Glasgow Computational Engineering Centre (GCEC), UK*  
now
- First supervisor of PhD student MD Ehsan Tanzib Sanglap, “*Transient simulation of triboelectric nanogenerators considering surface roughness*” (2022 - now)
  - Second supervisor of 3 PhD students
  - Leading the development of computational tools underpinning my collaborations with:
    - Dr Daniel Mulvihill (*JWSoE*) – optimisation of triboelectric nanogenerators [[YouTube](#)];
    - Prof Massimo Vassalli (*JWSoE*), Dr Alessandro Podestà (*Università degli Studi di Milano*) – biomechanical characterisation of cells;
    - Prof Daniele Faccio (*School of Physics and Astronomy*) – optical imaging of human brain;
    - Prof Sandy Cochran (*JWSoE*) – piezoelectric material characterisation.
  - Teaching blocks in following courses: Finite Element Analysis 4/M, Structures in Action M, Structural Mechanics 3, Statics 1; supervising students in MSc, MEng and BEng projects.

- Feb 2025 – **Co-Founder and Scientific Director**, *Mesh-Oriented Solutions Ltd*, Glasgow, UK  
 now ○ Mesh-Oriented Solutions (MOS) is a startup leveraging MoFEM to deliver tailored and automated simulation pipelines to a wide range of industrial partners. Drawing on my experience supervising research projects, I serve as the Scientific Director of MOS.
- Jan 2019 – **Postdoctoral Research Associate**, *University of Glasgow, JWSOE, GCEC*  
 July 2021 ○ Collaboration with *EDF Energy* and *Jacobs*: numerical simulation of brittle crack propagation in irradiated graphite bricks of nuclear reactor's core using **MoFEM** [YouTube];  
 ○ Co-supervisor of MEng students, tutor/marker for various undergraduate courses
- Oct 2018 – **Research Engineer**, *ARMINES*, Paris, France  
 Dec 2018 ○ Finite-element simulation of fluid leakage in contact interface using surface roughness measurements and an elasto-plastic material model for sealing applications in nuclear industry.
- Apr 2013 – **Research Assistant**, *Ioffe Institute*, St. Petersburg, Russia  
 Sep 2015 ○ Analytical and numerical investigation of non-linear strain solitary waves as a tool for the non-destructive testing of elastic waveguides.
- Jul–Sep 2013 **Intern**, *Airbus Operations SAS*, Toulouse, France  
 2013 ○ Finite-element modelling of the contact between the wing and the fuselage for optimisation of the aircraft final assembly process.
- Nov–Dec 2012 **Intern**, *General Motors Technical Center*, Warren, Michigan, USA  
 2012 ○ Simulation of the heat conduction during flash thermography for the non-destructive testing of battery packs and composite materials.

## Awards and distinctions

- Invited plenary keynote presentation at 7th ECCOMAS Young Investigators Conference (Portugal, 2023) [paginas.fe.up.pt]
- Invited plenary talks at conferences JIFT (France, 2021) and CSMA (France, 2022)
- PhD award *Prix HIRN* 2020 of the French Mechanical Association for the best dissertation of the preceding year in Tribology [minesparis.psl.eu]
- PhD award *Prix de thèse CSMA* 2019 of the French Computational Structural Mechanics Association (member of ECCOMAS) [csma.asso.univ-lorraine.fr]
- Prize for the best presentation by a postdoctoral researcher at 27th UKACM Conference on Computational Mechanics, University of London, 10-12 April 2019 [ukacm.org/conference-awards]

## Scientific outputs

1. I. Athanasiadis, **A.G. Shvarts**, Z. Ullah, K. Lewandowski, C.J. Pearce, Ł. Kaczmarczyk, *A computational framework for crack propagation along contact interfaces and surfaces under load*, Computer Methods in Applied Mechanics and Engineering, 414, 116129 (2023) [10.1016/j.cma.2023.116129]
2. **A.G. Shvarts**, J. Vignollet, V.A. Yastrebov, *Computational framework for monolithic coupling for thin fluid flow in contact interfaces*, Computer Methods in Applied Mechanics and Engineering, 379, 1, 113738 (2021) [10.1016/j.cma.2021.113738]
3. Ł. Kaczmarczyk **et al**, *MoFEM: An open source, parallel finite element library*, Journal of Open Source Software, 5, 45, 1441 (2020) [10.21105/joss.01441]
4. **A.G. Shvarts**, V.A. Yastrebov, *Trapped fluid in contact interface*, Journal of the Mechanics and Physics of Solids, 119, 140-162 (2018) [10.1016/j.jmps.2018.06.016]
5. **A.G. Shvarts**, V.A. Yastrebov, *Fluid flow across a wavy channel brought in contact*, Tribology International, 126, 116-126 (2018) [10.1016/j.triboint.2018.05.005]
6. **A.G. Shvartz**, F.E. Garbuzov, A.A. Semenov, A.M. Samsonov, *Determination of third-order elastic moduli via parameters of bulk strain solitons*, Technical Physics Letters, 42:121 (2016) [10.1134/S1063785016020073]
7. **A.G. Shvartz**, I.V. Semenova, G.V. Dreiden, A.M. Samsonov, *Strain solitary waves in a thin-walled waveguide*, Applied Physics Letters, 105, 211906 (2014) [10.1063/1.4902899]

- 22 talks at conferences, 12 publications in peer-reviewed conference proceedings

## Other responsibilities

- Reviewer for *Journal of Open Source Software*, *ASME Journal of Tribology*, *Tribology International* and *ANR, French National Agency for Research* (2020-now)
- Invited lecturer at the Federation of European Biochemical Societies (FEBS) School on Mechanics in Biology (2023)
- Co-organiser of UKACM School on Mixed Finite Element Formulations in Solid Mechanics (2023)
- Co-organizer of UKACM School on Advanced Topics in Computational Mechanics (2021) [\[recordings\]](#)
- Organiser of biweekly research seminars of the Glasgow Computational Engineering Centre (2023 - now)
- Co-organizer of quarterly workshops and monthly technical focus sessions on performing simulations in **MoFEM** for industrial partners: *EDF Energy* and *Jacobs* (2019-2021)
- Administrator of JWSOE Jupyter teaching server used by > 300 students simultaneously (2022-now)

## Languages

English	Full professional proficiency	<i>IELTS 8/9 (2018), TOEFL 108/120 (2015)</i>
French	Limited working proficiency	<i>Niveau B1, Cours Municipaux d'Adultes, Paris (2018)</i>
Russian	Mother tongue	

## Computer skills

- C/C++ ○ Java/C# ○ Python/Jupyter ○ MPI/OpenMP/OpenCL ○ Git/SVN ○ SGE/Slurm ○ Docker
- Spack ○ PETSc ○ MOAB ○ Paraview/PyVista ○ L<sup>A</sup>T<sub>E</sub>X ○ FEA/CFD software ○ MATLAB/Mathematica