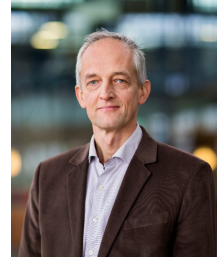


Marc Geers - Short CV

Marc G.D. Geers
Hoogleraar
Mechanics of Materials
Group Geers
EAISI Foundational
E-mail: M.G.D.Geers@tue.nl



Research profile

Marc Geers is a Full Professor in the Mechanical Engineering department at Eindhoven University of Technology (TU/e), and group leader of the Mechanics of Materials section. His research topics focus on solid mechanics, damage mechanics, micromechanics, multi-scale mechanics, computational mechanics with applications on advanced high-strength materials, metamaterials, materials for energy, health. He is also chairing the group's multi-scale lab, which allows for quantitative in situ microscopic measurements during deformation and mechanical characterisation of a broad class of materials, structures, MEMS etc. on a wide range of length scales from nanometres to centimetres. His research work serves the development of advanced engineering materials, additive manufacturing systems, MEMS & microsystems, materials for fusion, innovative metamaterials, etc. Most activities are carried out in support of key Dutch and European industrial partners. Research grants to support the work have been obtained in a structural manner from ERC (Advanced Grant), NWO (former STW, FOM), EU, M2i (Materials Innovation institute) and industry. At present, research focuses on the science of additive manufacturing, novel models for complex interfaces, novel methods to unravel and design mechanical metamaterials, novel methods to bridge scales combined with reduced-order approaches, and multi-physics problems.

His educational activities span all levels from BSc (e.g. solid mechanics), to MSc (e.g. continuum mechanics & nonlinear problems), to PhD (EM multi-scale and micromechanics; CISM courses). He supervised more than 50 PhD students, among which 14 are now faculty members in 11 different countries, whereas most other former PhD students started a successful career in industry.

Present and past academic positions & visits

2000 -	Full professor in Mechanics of Materials at the TU/e, Department of Mechanical Engineering
2011	Short term visiting senior researcher at Ecole des Mines de Paris, Centre des Matériaux, France
2003	Short term visiting professor, EPFL Lausanne, Switzerland
1991 - 2000	RMA Brussels, Belgium, Dept. of Civil and Materials Engng., Assistant/Associate professor
1998	TU/e, Mechanical Engineering, guest lecturer

Academic degrees

1997	PhD, TU/e Eindhoven (The Netherlands), Mechanical Engineering
1987	MSc, RMA Brussels (Belgium), Civil and Materials Engineering

Relevant present/past affiliations and functions

- President of the European Mechanics Society EUROMECH
- Member of the Board of the Netherlands Mechanics Committee
- Cluster coordinator of the cluster Multiscale fundamentals of materials and Program Committee member of the Materials Innovation Institute
- Member of the GAMM research group on Multiscale Material Modelling
- Member of the GAMM research group on Analysis of Microstructures
- Member of the Board Engineering Mechanics Graduate School and Scientific director from 2007 to 2017
- Member of the Board of Governors of the Foundation for Fundamental Research on Matter (2009-2016)
- Chairman of the Euromech Mechanics of Materials EMMCC committee (2009-2018)
- Member of the General Assembly of the International Union of Theoretical and Applied Mechanics (IUTAM) (2015-2017)

Editorial Boards memberships, guest editing

- Associate Editor of the *European Journal of Mechanics A/Solids* (2014-..)
- Associate Editor of the *ASME Journal of Applied Mechanics* (2010-2013)
- Member of the Editorial Committee of the *Éditions de l'École polytechnique*
- Editorial Board of the *Proceedings of the Royal Society A*
- Editorial Board of *Computational Mechanics*

- Editorial Board of *Computer Methods in Applied Mechanics and Engineering*
- Editorial Board of the *International Journal of Multi-scale Computational Engineering*
- Editorial Board of the *Journal of Multiscale Modelling*
- Editorial Board of the *Journal of Nanomechanics & Micromechanics*
- Editorial Board of the *International Journal of Automotive & Mechanical Engineering*
- Editorial Board of *Advanced Modeling and Simulation in Engineering Sciences*
- Editorial Board of the *Journal of Coupled systems and Multiscale Dynamics*
- Editorial Board of the *Journal of Mechanical Behaviour of Materials*
- Editorial Board of the *Journal of Surfaces and Interfaces of Materials*
- Editorial Board of *Plasticity and Mechanics of Defects*
- Editorial Panel of *Advanced Materials Theory*
- Guest editorships: *Philosophical Magazine*, *International Journal of Multi-scale Computational Engineering*, *Engineering Fracture Mechanics*

Research assessments:

In 2013, a Review Committee composed by international experts assessed the research in Mechanical Engineering at Eindhoven University of Technology (TU/e). This assessment covered the research in the period 2007-2012, and was carried out in accordance with the Standard Evaluation Protocol 2009-2015 for Research Assessment in the Netherlands (SEP). The group Mechanics of Materials thereby received the maximum score, whereby quality (5/5), quantity (5/5), relevance (5/5) and viability(5/5) were assessed. In 2019, a novel research assessment, at the Department level, reconfirmed this excellent result.

Scientific committees & conference organization (past 10 years)

Committees	THERMEC(2011), CMM(2011), ICHMM(2011), ICMM (2013), CERMODEL (2013), Numiform (2013), CMM (2013), IWCMM (2013), SMART (2013), CFRAC (2013), EMMC(2014),MTDM (2014), IUTAM-symp (2014), EMMC(2014), IWCMM (2014), WCCM-ECCM (2014), UNCECOMP(2015), CSMA(2015), CFRAC(2015), ICCSM(2015), ICMM(2015), ICMER(2015), ICMCSF(2015), ICOMP (2016), NUMIFORM (2016), Dislocations (2016), ECCOMAS (2016), EMMC (2016), CERMODEL (2017), CFRAC (2017), CMM (2017), CSMA (2017), Euromech-592 (2017), ICMM (2017), ICMER (2017), ICCM (2017), SCT (2017), SteelSim (2017), UNCECOMP (2017), AEM (2018), Biomechanics (2018), CMST (2018), ECCM (2018), EMMC (2018), ICCM (2018), ICCSM (2018), ICOMP (2018), CFRAC (2019), ICCM (2019), ICMM (2019), NUMIFORM (2019), PCM-CMM (2019), STEELSIM (2019), UNCECOMP (2019)
Evaluation panels	NWO, STW, Senter, IWT, CNRS, FWO, ERC, DFG and multiple professor or tenure track committees. STW Programme Committee on Multiscale Simulation Tools, NWO programme committee on Complexity, Advisory Board Belgian IAP Physics based multilevel mechanics of metals; Research assessment committee DTU, Denmark, 2010+2015;TNO, 2013; ONERA, 2013
Organizer events	MRS-fall 2009, Lorentz-workshop Multiscale 2009, MMM 2010, CFRAC 2011, ICTAM 2012, ESMC 2012, ECCOMAS 2012; ICMM 2013; WCCM 2014; ICMM 2014; CFRAC 2015; ECCOMAS 2016; CFRAC 2017; ECCM 2018; MSE 2018; WCCM 2018; CFRAC 2019; COMPLAS 2019; ECCOMAS-CMCS 2019
Chair/Co-chair	Chair of the IUTAM symposium on Multi-scale plasticity of crystalline materials (Eindhoven, 2007); Co-chair of EUROMECH colloquium 537 (Marne-la-Vallée, 2012) and ECCOMAS thematic conferences on Computational Modeling of Complex Materials across the scales (Paris, 2017; Glasgow, 2019)

Publication track record

>300 publications in peer-reviewed scientific journals>250 publications in conference proceedings
<http://www.tue.nl/mechmat> Citation scores:

- *Web-of-Science*: h-index = **51** ; > **10000** citations
- *Scopus*: h-index = **55** ; > **12000** citations
- *Google Scholar*: h-index = **69** ; > **18000** citations

Promotor PhD theses

52 supervised PhD theses, downloadable from <http://www.tue.nl/mechmat>

Plenary, keynote and invited lectures (past 10 years)

Plenary lectures	ACOMEN (2008), ESAFORM (2008), GAMM (2009); Marine (2009), Giens (2009), ICCSM (2009), ECCM (2010), CFRAC (2011), ECCOMAS (2012), IWCMM (2013), ESMC (2015); PCM-CMM (2015); IWCMM (2015), ICOMP (2016), WCCM (2016), IWCMM (2018), COMPLAS (2021)
Keynote lectures	GAMM (2005), COMPLAS (2005), THERMEC (2006), WCCM (2006), Plasticity (2007), WCCM (2008), EUROSIME (2009), THERMEC (2009), MMM (2010, 2012), M2i (2013), WCCM(2014), CFRAC(2015), Euromech-Porto (2016), Materials Chain conf. (2016), GAMM-microstructures (2017), EMPA-Zürich (2017), ECCM (2018), SES (2018), COMPLAS (2019)
Invited lectures	More than 100 other invited lectures at conferences, meetings and universities

Grant track record (> 15 MEuro)

ERC (Advanced grant); EU (FP7, Marie Curie, EJMD); NWO (Netherlands Organisation for Scientific Research); STW (Dutch Technology Foundation); FOM (Foundation for Fundamental Research on Matter); M2i (Materials Innovation Institute - NIMR); MicroNed; Senter; TNO; Interuniversity Attraction Pole (with partners in Belgium); Direct funding from industry (several projects)

> 100 Member of external PhD and Habilitation committees

The Netherlands	TU/e; TU Delft; UT Twente; RuG Groningen; KUN Nijmegen
Belgium	UCL, Louvain-la-Neuve; KUL, Leuven; ULB, Brussels; VUB, Brussels; ULg, Liège
France	ENS Cachan, Paris; Ecole des Mines de Paris; Université Pierre & Marie Curie, Paris VI, Université Paul Verlaine – Metz ; Université de Grenoble ; Ecole Polytechnique ; Université d'Auvergne
Switzerland	EPFL, Lausanne
Germany	University of Dortmund; University of Stuttgart; University of Kaiserslautern; Karlsruhe Institute of Technology; Leibniz Universität Hannover
Sweden	Chalmers, Göteborg
Denmark	DTU, Copenhagen
Italy	Politecnico di Milano
Spain	Universidad Politecnica de Madrid

Educational (lecturer) track record

- BSc courses on Applied Elasticity in Engineering, Mechanical Properties of Materials, Continuum Mechanics, Strength of Materials, Solid Mechanics
- MSc courses on Damage Mechanics, Finite Elements, Stability of Structures
- Graduate courses (PhD level) on Mechanics of Material Nonlinearities, Micromechanics, Forming processes, Multiscale Mechanics, Computational Homogenization and Damage Mechanics at CISM (4x), GrasMech (Belgium), EM (Dutch Graduate School on Engineering Mechanics, every 2 years)
- Contributions to Summer schools at CISM, Glasgow, Stuttgart, Hannover, Rijeka, Leuven, ...

University service (roles taken in the period 2000-2020)

4TU-level (association of the Technical Universities in the Netherlands): 3TU-committee on Computational Sciences and Engineering; Board member of the Research Centre High-Tech Materials; Board member of the Research Centre Fluid and Solid Mechanics

University level: Chair of the University's Scientific Advisory Board; Platform Academic Education; Standing Patent Committee; Steering group Educational Vision; Exam appeals committee; Reward & Recognition committee

Department level: Vice-dean; Research Committee; Educational Committee; Chairman of the Exam committee; Strategy committee; Appointment committees (all levels); MSc admission committee; Educational reform committee; BSc curriculum committee

Fields of research interests

- Multiscale mechanics and structure-property modelling
 - Advanced homogenization and coarse graining methods
 - Computational multiscale solution methods
 - Discrete-to-continuum transitions
- Computational and Experimental Micromechanics
 - Crystal plasticity and dislocation mechanics
 - Evolving microstructures
 - Interfacial mechanics and delamination
- Damage, Fracture and Reliability
 - Continuum damage methods
 - Damage-to-fracture modelling
 - Discrete failure mechanisms

Multiscale mechanics and structure-property modelling:

- Advanced homogenization and coarse graining methods
- Computational multiscale solution methods
- Discrete-to-continuum transitions

Computational and Experimental Micromechanics:

- Crystal plasticity and dislocation mechanics
- Evolving microstructures

– Interfacial mechanics and delamination

Damage, Fracture and Reliability:

- Continuum damage methods
- Damage-to-fracture modelling
- Discrete failure mechanisms

Multi-scale laboratory

This lab takes a rather unique position as it bridges the gap between traditional materials science and mechanical characterisation, by integrating mechanical testing with (real-time and in situ) microscopic observation. With a focus on developing novel (miniature) testing devices and strategies, the lab allows for quantitative in situ microscopic measurements during deformation and mechanical characterisation of a broad class of materials, structures, MEMS etc. on a wide range of length scales from nanometres to centimetres. The lab perfectly fits in the research group's mission, and enables a symbiosis between computational modelling and advanced experimentation across the scales.

Primary industrial partners in related research projects

Philips (Research, DAP, Lighting), NXP, EPCOS, Tata Steel, Canon R&D, Gouda VV, Kappa Packaging, De Schelde, HOLST Centre, DAF, ASML, NRG, INPRO, PDE, Shell, Stork, DSM, NLR, TNO (industry & automotive), Helianthos, Polymer Vision, Medtronic, RAMLAB, VDL.

Journal Reviews

Review work for >35 international journals

10 selected publications, since 2000

1. O. Rokos, M.M. Ameen, R.H.J. Peerlings, M.G.D. Geers, Micromorphic computational homogenization for mechanical metamaterials with patterning fluctuation fields, *Jnl. Mech. Phys. Solids*, 123, 119-137, 2019.
2. A. Sridhar, V.G. Kouznetsova, M.G.D. Geers, A general multiscale framework for the emergent effective elastodynamics of metamaterials, *Jnl. Mech. Phys. Solids*, 111, 414-433, 2018.
3. T.W.J. de Geus, J. Vondrejč, J. Zeman, R.H.J. Peerlings, M.G.D. Geers, Finite strain FFT-based non-linear solvers made simple, *Comp. Meth. Appl. Mech.*, 318, 412-430, 2017.
4. M.G.D. Geers, M. Cottura, B. Appolaire, E.P. Busso, S. Forest, A. Villani, Coupled glide-climb diffusion-enhanced crystal plasticity, *Jnl. Mech. and Physics of Solids*, 70, 136-153, 2014
5. E.W.C. Coenen, V.G. Kouznetsova, M.G.D. Geers, Novel boundary conditions for strain localization analyses in microstructure volume elements, *Int. Jnl. Num. Meth. Engng.*, 90(1), 1-21, 2012. 4.M.G.D. Geers, V.G. Kouznetsova, W.A.M. Brekelmans, Multiscale computational homogenization: trends and challenges, *Jnl. Comp. Applied Math.*, 234(7), 2175-2182, 2010.
6. M.G.D. Geers, V.G. Kouznetsova, W.A.M. Brekelmans, Multiscale computational homogenization: trends and challenges, *Jnl. Comp. Applied Math.*, 234(7), 2175-2182, 2010.
7. I. Ozdemir, W.A.M. Brekelmans, M.G.D. Geers, Computational homogenization for heat conduction in heterogeneous solids, *Int. Jnl. Num. Meth. Engng.*, 73(2), 185-204, 2008.
8. T.J. Massart, R.H.J. Peerlings, M.G.D. Geers, An enhanced multi-scale approach for masonry wall computations with localization of damage, *Int. Jnl. Num. Meth. Engng.*, 69(5), 1022-1059, 2007.
9. M.J. van den Bosch, P.J.G. Schreurs, M.G.D. Geers, An improved description of the Xu and Needleman cohesive zone law for mixed-mode decohesion, *Engng. Frac. Mech.*, 73(9), 1220-1234, 2006.
10. M.G.D. Geers, Finite strain logarithmic hyperelasto-plasticity with softening: a strongly nonlocal implicit gradient framework, *Comp. Meth. Appl. Mech. Engng.*, 193(30-32), 3377-3401, 2004.