Curriculum vitae with track record

PERSONAL INFORMATION

Family name, First name: Mardal, Kent-Andre

Date of birth: *26.11.1974*

Sex: Male

Nationality: Norwegian
Researcher unique identifier: https://orcid.org/0000-0002-4946-1110
URL for personal web site: http://folk.uio.no/kent-and

EDUCATION

2003   PhD, Thesis title: Software and Numerical Methods for the Incompressible Navier-Stokes Equations. Supervisors: Hans Petter Langtangen and Aslak Tveito Department of Informatics, University of Oslo.

1999   Cand. Scient, Department of Mathematics, University of Oslo, Norway

CURRENT AND PREVIOUS POSITIONS

2015-present   Professor, Division of Mechanics, Department of Mathematics, University of Oslo, Norway

2014-present   Adjunct Scientist, Scientific Computing Department, Simula Research Laboratory, Norway

2019-present   Consultant for Expert Analytics.

2014-2015   Associate Professor, Division of Mechanics, Department of Mathematics, University of Oslo, Norway

2007-2014   Senior Scientific Researcher, Simula Research Laboratory, Norway

2003-2014   Associate Professor (20%), Department of Informatics, University of Oslo, Norway

2003-2007   Postdoctoral Fellow, Simula Research Laboratory, Norway

FELLOWSHIPS, AWARDS, GRANTS

2020-2024:   Alzheimer´s physics, FRIPRO 12 MNOK, PI

2019-2023:   SciML – Scientific Machine Learning, IKTPLUSS 16 MNOK, PI

2018-2021:   Novel cascade technology for optimal utilization of animal and marine by products, workpackage leader of 2MNOK, BIONÆR

2017-2018:   Brain, aging and neurodegenerative disease - exchange with Neuroscientists in Tolouse , 80 KNOK., Co-PI

2017-2021:   Industrial Ph.D. OPSECTS - Optimal Patient Specific Electro Convulsive Therapy Simulator with Expert Analytics, PI

2017-2019:   Nordforsk grant for developing new scandinavian course in "Computational Mathematical Modeling", co-PI with Logg (Chalmers) and Mathiesen (Copenhagen), 900 KNOK.

2015–2016:   Improved intracranial pressure estimations using cloud-based simulations of the cerebral blood flow. Fortissimo, EU-7th Framework Program, 200 000 euros, co-PI.

2011–2015:   Patient-specific mathematical modeling with applications to clinical medicine: Stroke and syringomyelia, PI, 0.8 million euros. NFR funded because it was on the shortlist for ERC funding.

2011–2012:   Magnitude of Turbulence in CSF Flow. The Chiari & Syringomyelia Foundation funded a grant of $30,000. PI.

2003–2006:   Mixed methods for the stress-displacement formulation of elasticity – A software framework for advanced finite element methods. Norwegian Research Council.

SUPERVISION

Main supervisor of 8 PhD students; 6 successfully completed (Gunnar Staff [2006], Kristian Valen-Sendstad [2011], Karen Støverud [2014], Øyvind Evju [2016], Magne Nordaas [2017], Lars Magnus Valnes [2019]; 2 ongoing (Karl Erik Holter, Jacob Schreier). Co-supervisor of 16 PhD students; 9 successfully completed (Martin Alnæs [2009], Sigrid Dahl [2012], Ole Elvetun [2015], Giulia Pizzichelli [2016], Kartik Jain [2016], Miroslav Kuchta [2017], Owais Khan [2017], Trygve Bærland [2019], Vegard Vinje [2019]), and 7 ongoing (Eleonora Piersanti, Tormod Landet, Jørgen Dokken, Ada Ellingsrud, Christian Pedersen, Rossana Molina). Supervisor of 44 MSc students (41 successfully completed and 3 ongoing) and 4 postdocs; 3 successfully completed (Martin Alnæs, Simon Funke, Erika Lindstrøm) and one ongoing (Miroslav Kuchta).

TEACHING ACTIVITIES (University of Oslo)

MEK3570 - Computational Solid Mechanics H17, H18
MEK4250 - Computational Mechanics V17, V18, V19
MEK3220 - Continuum Mechanics H14, H15, H16, H19.
INF-MAT5650 - Finite Elements for Partial Differential Equations V13 and V14.
INF-MAT3360 - Partial Differential Equations V12 and V13.
INF5670 - Numerical Methods for Navier-Stokes equations H04, H06, H07, and H09.
INF5600 - Iterative Methods and Multigrid V02, V03, V04, V05, V07, and V10.
INF5660 - INF5660 - Advanced problem solving with high level languages V04, V05, V06, V07

ORGANISATION OF SCIENTIFIC MEETINGS

CSF Symposium 2019 (ca 50 participants), Bio-Mechanics workshop on cell membrane dynamics, micro-circulation and plasticity in tissue (Oslo, 2018 ca 50 participants), Biomechanics of living systems from cells to organisms, (Oslo, 2017, ca 50 participants), Nordic Seminar of Computational Mechanics 26 (Oslo, 2013, ca 150 participants), 2013 and numerous workshops in 2007-2017 within the Center of Excellence Biomedical Computing.

PROJECT MANAGEMENT EXPERIENCE

2007-2017   Group Leader of Biomedical Flows and Structures group at Center of Excellence, Center for Biomedical Computing (CBC), Simula Research Laboratory, Norway

COMMISSIONS OF TRUST

Reviewer for funding agencies: Université libre de Bruxelles (ULB) 2019, The French National Research Agency (ANR, 2012 & 2017); Canadian Council for the Arts, Killam Fellowship, 2016, Research Foundation Flanders (FWO) Belgum (2013, 2016)

Editorial responsibilities: 1: Fluids and Barriers in the CNS

Reviewer for scientific journals: >15, ACM Trans. Math. Softw, Am J Neuroradiol, BIT Numer. Math, J. Biomech, Cardiovasc Eng Technol, Int J Numer Method Biomed Eng, J Fluid Mech, Math. Comp. Numer. Anal. PLOS One, J Sci Comput, SIAM J. Numer. Anal., SIAM Journal of Sci. Comput., SIAM J. Numer. Math., Fluids and Barriers in the CNS.

Member of thesis committees: 10; Paolo Zuniga (Chile, 2019), Lorenzo Sala (Strasbourgh 2019), Mats Brun (Bergen, 2019), Marcela Szopos (Strasbourg, 2017), Helena Svihlova (Prague, 2017), Kartik Jain (Siegien, 2016), Giulia Pizzichelli (Pisa, 2016), Erika Lindstrøm (Oslo, 2015), Arne Morten Kvarving (Trondheim, 2010), Sylfest Glimsdal (Oslo, 2010)

MAJOR COLLABORATIONS (current, not including PhD students and Post Docs)
Per Kristian Eide and Geir Ringstad, University Hospital of Oslo, Norway
Paulo Zunino, MOX, Milan, Italy
Ludmil Zikatanov, Penn State, US
Simon Funke, Marie Rognes and Aslak Tveito, Simula Research Laboratory
Ragnar Winther, Andreas Carlson, and Andre Erhardt University of Oslo
Anders Dale and Anna Devor, University California, San Diego, US
Zdenek Strakos, University of Prague, Czech Republic
Anders Eklund and Karen Støverud, University of Umeå, Sweden

Track record:

INVITED LECTURES AT INTERNATIONAL MEETINGS:
Invited keynote/plenary, 13; Mathematical models in health sciences, Nantes, 2018; I
Mathematical and Numerical Modeling of the Cardiovascular System, iNdAM, Rome 2018;
Enumath Voss, 2017; Interpore, Rotterdam 2017; HPCSE Ostrava 2017; Cerebrospinal Fluid
Dynamics Society Meeting, Atlanta 2017; American Association of Spine Radiology San Diego 2017;
American Socity of Neuroradiology, Chicago 2015; International Hydrocephalus Imaging Working
Group, Chicago 2015, Cerebrospinal Fluid Dynamics Society Meeting, Amiens 2015; Gordon
Conference on Flow & Transport in Permeable Media Portland 2014; Preconditioning Conference,
Oxford 2013, Modelling of physiological flows, Sardinia 2013.
More than 100 presentations at conferences and workshops internationally and nationally.

SCIENTIFIC SOFTWARE:
I have made significant contributions to FEniCS, in particular the multiple packages cbc.block,
dolfin, instant, UFC, SyFi, Exterior. Earlier, I contributed to Diffpack and VMTK.

The book about the software framework FEniCS *:*
"Logg A, Mardal KA, Wells G, Automated solution of differential equations by the finite element.
Springer 2012." **has now been cited more than 1800 times since 2012**.

MAJOR CONTRIBUTION TO EARLY CAREERS OF EXCELLENT RESEARCHERS:
Alnæs (with Mardal) developed core components of FEnICS used by thousands of users around
the world. After his Post Doc, he has continued as a group leader in the Center of Excellence,
Center for Biomedical Computing at Simula. Valen-Sendstad, Jain, Nordaas and Støverud have
been Post-Docs hired by world-leading scientists in fields that are relevant, D. Steinman, V.
Kurtcuoglu, A. Logg and A. Eklund. Valen-Senstad is now a senior scientist at Simula.

DISSEMINATION:
In 2011 my research on cerebral aneurysms was featured in 9 Norwegian newspapers, magazines
including VG. In 2017, my research on Alzheimer and clearance of waste during sleep is featured
on NRK (NRK skole, lærerike programmer og klipp):
https://www.nrk.no/embed/PS*310437?autoplay=true
In 2018 our research on Alzheimer appeared in VG, Norway´s most selling newspaper.
https://www.vg.no/forbruker/helse/i/VRwBK4/norske-forskere-soevn-kan-bremse-demens
2019, both NRK, P1 and Forskning.no published reports concerning our paper that relates
breathing with brain clearance.

BRIEF SUMMARY OF PUBLICATIONS:
89 articles with 153 co-authors, citations/H-index (March 2019): 1818/22 (Scopus), 4973/27 (Google Scholar), papers with more than 100 citations: 8. Publications in top-tier journals Proceedings of National Science of Academy USA, Journal of Clinical Investigation Insight as well as top-tier journals in scientific computing, numerical analysis, biomechanics and neuroradiology; SIAM J. Sci Comput, SIAM J. Numer Anal., J. Biomech, Am J Neuroradiol, NeuroImage, One co-authored and two co-edited books, one co-authored book accepted at Springer. 51 book chapters or refereed proceedings.
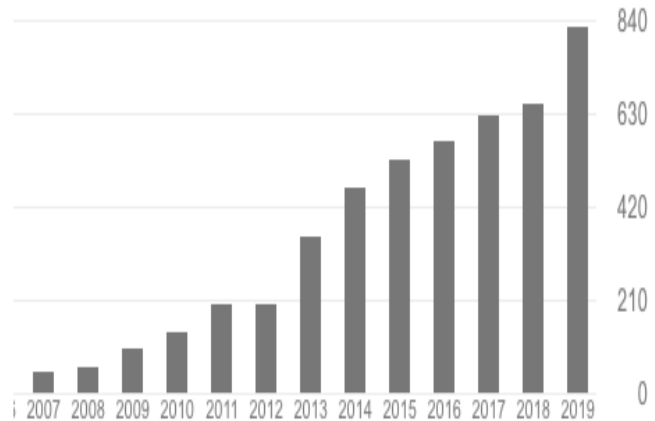
Citations from Google Scholar, Des 20, 2019

TEN SELECTED PAPERS: (Impact factor of journal (IF) and citations from Google Scholar in bold)**:**
[1] Ringstad G, Valnes LM, Dale AM, Pripp AH, Vatnehol SA, Emblem KE, **Mardal KA**, Eide PK. Brain-wide glymphatic enhancement and clearance in humans assessed with MRI. Journal of Clinical Investigations: Insight. 2018 Jul 26;3(13) **(IF: 13.3, citations: 38)**.
[2] Holter KE, Kehlet B, Devor A, Sejnowski TJ, Dale AM, Omholt SW, Ottersen OP, Nagelhus EA, **Mardal KA**, Pettersen KH. Interstitial solute transport in 3D reconstructed neuropil occurs by diffusion rather than bulk flow. Proc. National Academy of Sciences. 2017 **(IF: 9.5, citations: 67)**
[3] Lindstrøm EK, Ringstad G, **Mardal KA,** Eide PK. Cerebrospinal fluid volumetric net flow rate and direction in idiopathic NPH. NeuroImage: Clinical. 2018; **(IF: 5.4, citations: 12)**
[4] Ringstad G, Lindstrøm EK, Vatnehol SA, **Mardal KA**, Emblem KE, Eide PK. Non-invasive assessment of pulsatile intracranial pressure with phase-contrast magnetic resonance imaging. PloS one. 2017 Nov 30;12(11):e0188896. **(IF: 2.8, citations: 11)**
[5] Lee JJ, Piersanti E, **Mardal KA**, Rognes ME. A mixed finite element method for nearly incomp. multiple-network poroelasticity. SIAM J. on Scientific Computing. 2019 (**IF: 2, citations: 13).**
[6] Lee JJ, **Mardal KA**, Winther R. Parameter-robust discretization and preconditioning of Biot's consolidation model. SIAM J. on Scientific Computing. 2017. **(IF: 2, citations: 42)**
[7] Valen-Sendstad K, **Mardal KA**, Mortensen M, Reif BA, Langtangen HP. Direct numerical simulation of transitional flow in a patient-specific intracranial aneurysm. Journal of biomechanics. 2011 Nov 10;44(16):2826-32. **(IF: 2.4, citations: 101)**
[8] Bærland T, Kuchta M, **Mardal KA**. Multigrid Methods for Discrete Fractional Sobolev Spaces. SIAM Journal on Scientific Computing. (in press) **(IF: 2, citations 3)**
[9] Funke SW, Nordaas M, Evju Ø, Alnæs MS, **Mardal KA**. Variational data assimilation for transient blood flow simulations: Cerebral aneurysms as an illustrative example. International journal for numerical methods in biomedical engineering. 2019;35(1):e3152 **(IF: 2.4, citations: 6)**.
[10] **Mardal KA**, Winther R. Preconditioning discretizations of systems of partial differential equations. Numerical Linear Algebra with Applications. 2011 Jan;18(1):1-40. **(IF: 1.3, citations: 204)**