Curriculum Vitae

Hans Petter Langtangen

Last update: January 28, 2015
Current position: Fellow, Simula Research Laborotary
Part time position: Professor, Dept. of Informatics (on 80% leave)
Date of birth: January 3, 1962
Nationality: Norwegian
Home page: http://folk.uio.no/hpl

Education

1986-1989: Dr. Scient. (Ph.D.) in Mechanics, Dept. of Mathematics, Univ. of Oslo.
1981-1985: Cand. Scient. (M.Sc.) in Mechanics, Dept. of Mathematics, Univ. of Oslo.

Employment history

2012-:   Fellow, Simula
2011-2012: Head of the BioComp Department, Simula
2007-:   Director of *Center for Biomedical Computing* (Norwegian Center of Excellence, "SFF")
2007-2009: Head of the Scientific Computing Department, Simula
2003-2007: Adjunct Professor at the Center of Excellence *Physics of Geological Processes*
2002-2003: Head of the Scientific Computing Department, Simula
2001-2012: Research Scientist and Professor, Simula Research Laboratory
1999-:   Professor, Dept. of Informatics, Univ. of Oslo (on 80% leave from 2001)
1999-2002: NorFA Professor, Dept. of Scientific Computing, Uppsala University (20%)
1998-1999: Professor (of Mechanics), Dept. of Mathematics, Univ. of Oslo
1991-1998: Assistant Professor (of Mechanics), Dept. of Mathematics, Univ. of Oslo
1991-1997: Research Advisor, SINTEF Applied Mathematics (20%)
1990-1991: Research Scientist, SINTEF Applied Mathematics
1986-1990: Research Assistant, Dept. of Mathematics, Univ. of Oslo
1985-1986: Military service as Researcher, Norwegian Defence Research Establishment (FFI)
1984-1985: Research Assistant, Dept. of Mathematics, Univ. of Oslo (50%)

Research areas

- Numerical solution of partial differential equations
- Biomechanics, water waves, CFD, porous media flow
- Scientific software and implementation techniques
- Stochastic mechanics

Professional activities

1. Authored 4 books, co-edited 3 books, published 56 journal papers, 61 conference papers or book chapters with review, 25 papers in proceedings without review, and contributed to 137 scientific presentations.
2. Editor-in-Chief of *SIAM Journal on Scientific Computing* (2011–)

3. Member of Editorial Boards:

- *Advances in Water Resources*
- *BIT Numerical Mathematics*
- *International Journal of Computational Science and Engineering*
- *Journal of Computational Science*
- *International Journal of Computing Science and Mathematics (IJCSM)*

4. Project leader (director) 2007-2017 for a Center of Excellence grant financed from the Research Council of Norway ("SFF").
5. Elected member of the European Academy of Sciences (EAS). Also member of the Scientific Committee for Computational and Information Sciences in EAS.
6. Elected member of the Norwegian Academy of Science and Letters (Det norske vitenskapsakademi).
7. Elected member of the IFIP Working Group 2.5 (*http://www.nsc.liu.se/wg25/*), a group of distinguished scientists working with advances in numerical software.
8. Co-Chair of SIAM Conference on Computational Science and Engineering 2013 (close to 1400 participants).
9. Member of the organizing or scientific committees for the following conferences:

- SciTools'96
- SciTools'98
- Nordic Seminar on Computational Mechanics 2000 (NSCM 13)
- ECCOMAS 2001 (European Organizing Committee)
- Dagsthul Conference on High-Performance Computing 2003
- The 13th Finite Elements in Fluids Conference 2005
- The Parallel High-Performance Computing workshop at the European Conference on Object-Oriented Programming 2005, 2006 and 2008
- IFIP WG 2.5 Workshop on Software Issues in Computational Science and Engineering 2007
- Parallel Computing 2007 (ParCo2007) Conference
- Web Based Distributed Computing track of the International Conference on Distributed Computing (ICDCS) 2008
- The Scientific Computing track of the International Conference on Complex, Intelligent and Software Intensive Systems (CISIS) 2009
- BIT 50th Anniversary Conference 2010
- SIAM Computational Science and Engineering Conference 2011, 2013
- EuroSciPy 2011, 2012, 2013
- National Conference Series on Computational Mechanics (MekIT'01, 03, 05, 07, 09, 11)
- 26th Nordic Seminar on Computational Mechanics 2013
- International Conference on Computational Science (ICCS) 2014, 2015
- High Performance and Parallel Computing for Materials Defects and Multiphase Flows, at the Institute for Mathematical Sciences (IMS), National University of Singapore, 2015

10. Organized minisymposia or workshops at the following conferences:

- SIAM Geoscience conference 1997, San Antonio (with A. Tveito)
- IMACS 2000, Lausanne (with S. Turek)
- Int. Conf. for Computational Science (ICCS) 2002, Amsterdam (with C. Pflaum, U. Ruede and S. Turek)

- SIAM Conference on Computational Science and Engineering 2005, Orlando (with P. Peterson)
- SIAM Conference on Computational Science and Engineering 2009, Miami (three minisymposia with R. LeVeque and F. Perez)
- BIT 50th Anniversary Conference 2010 (with K.-A. Mardal)
- SIAM Conference on Computational Science and Engineering 2011, Reno (two minisymposia with R. LeVeque and F. Perez)
- SIAM Conference on Computational Science and Engineering 2013, Boston (four minisymposia with W. Bangerth, A. Logg, and U. Ruede)

11. Principal developer of Diffpack, a widespread software package for numerical solution of partial differential equations. The success of Diffpack spawned a company, Numerical Objects A.S, and in 2003 the technology was sold to the German company inuTech GmbH. Diffpack's customer list includes corporates such as DaimlerChrysler, Intel and NASA, and universities such as Cambridge, Cornell and Stanford.
12. Developer and maintainer of numerous software packages.
13. Head of the Simulation and Visualization research group at the Dept. of Informatics, Univ. of Oslo, 2002-2008.
14. Acted as opponent at 21 doctoral dissertations (Lund University, Linköping University, Chalmers University of Technology, Uppsala University, University of Leuven, University of Delft, University of Utrecht, Norwegian University of Technology, University of Bergen, Norwegian University of Life Sciences, University of Oslo).
15. Scientific Consultant for SINTEF, Norwegian Defence Research Establishment (FFI), Veritas Research, Saga Petroleum, SensoNor, Numerical Objects A.S., and inuTech GmbH.
16. Project leader of "Tsunami generation and propagation due to asteroid impacts and landslides", 2002-2006, funded by the Research Council of Norway.
17. Supervised (or co-supervised) 22 Dr. Scient. or Ph.D., 69 Cand. Scient. or M.Sc., and 7 siv. ing. (M.Sc., NTNU) students in mechanics and informatics.
18. Initiated 10 new university courses in mechanics, numerical methods, and scientific software development.
19. Developed and taught numerous short courses on scientific software development with C++ and Python.
20. Numerous invited talks at conferences, universities, and companies.
21. Awards:

    (a) Center for Industrial Research's creativity award in information technology, 1992
    (I-seksjonens kreativitetspris, Senter for industriforskning)

    (b) The Norwegian Export Council and The Norwegian Computer Association's creativity award (with A. M. Bruaset), 3rd prize, 1996
    (Norsk Eksportråd og Norsk Dataforenings kreativitetspris)

    (c) Award for research in information technology (with A. M. Bruaset) from the University of Oslo, Oslo Community, and Oslo Research Park, 1996 (Blindernkonferansens forskningspris)

    (d) Simula Research Laboratory Research Award, 2003

    (e) The informatics students' "Best Teacher Award", 2003

Scientific work

My research is about expanding the applications of numerical simulation to new problems. In particular, I have tried to develop generic numerical solution approaches, applicable to a wide range of problems, and implement these approaches in reusable software components using modern programming tools and techniques. The goal is to attack complicated multi-physics problems of scientific and industrial interst and develop simulation codes in a faster and more reliable way.

Most of my scientific publications belong to one of the following categories:

- numerical methods in fluid dynamics,

- numerical methods for stochastic mechanics problems,

- numerical software based on scripting and object-oriented programming.

The focus on fluid dynamics and stochastic problems came from my first career track (from PhD to full professor) in mechanics at the Department of Mathematics. Later, after moving to the Department of Informatics and focusing more on scientific software issues, we felt a need to widen the application diversity to test that our generic software solutions really had the promised degree of generality. In the work with applications outside my main fluid dynamics field of competence, I have always collaborated with application experts.

At Simula, I have participated in a number of activities, working with numerics, software, and modeling issues. Fluid flow has been a dominating application area, in particular tsunami propagation modeling. After establishing *Center of Biomedical Computing* (a Norwegian Center of Excellence) in 2007, my main applications have concerned fluid flow and solid deformation in two types of geometrically very complicated and highly heterogeneous media: the human body and geological formations.

My numerical work is still dominated by finite element methods, although I have broaden the scope lately by also looking into spectral methods and Lattice Boltzmann methods. On the software side, my work mainly concerned the development of the object-oriented Diffpack programming environment in the period 1991-2003, while after about 2000 I have investigated and promoted Python as a promising programming platform for scientific applications. My Springer books about Diffpack and Python have been best-sellers in their categories and helped attract significant international interest to these subjects.

During my whole career I have been excited by teaching, and especially by creating novel courses that migrate new methods and working styles in research to diverse levels of the education system. It has been very inspiring to take active part in a major educational reform at the University of Oslo, started in 2003, where programming and numerical simulation are integrated in classical science courses. By 2013, this reform has attracted widespread international and national recognition.

Our research group at Simula Research Laboratory has been evaluated by international panels, conducted by the Research Council of Norway, in 2001, 2004, 2009, 2011, and 2012. In all evaluations we received the highest rank ("Excellent").

Teaching

I have lectured the following courses[1]:

- Spring 1987: Particle and rigid body dynamics (ME101, UiO)

- Fall 1987, 1988: Introductory continuum mechanics (ME105, UiO), problem solving class

- Spring 1988: Introduction to fluid mechanics (ME102, UiO)

- Spring 1988, 1989: Mathematical modeling and material mechanics (ME360, UiO)

- Spring 1989-1995: Numerical methods in continuum mechanics (ME-IN324, UiO)

- Fall 1989-1991: Classical mechanics and variational principles (ME210, UiO), problem solving class

- Spring 1992: Introduction to fluid mechanics (ME102, UiO)

- Spring 1993, fall 1993: Material mechanics and elasticity theory (ME204, UiO)

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[1]UiO means University of Oslo.

- Fall 1994-2005: Advanced continuum mechanics (ME211/MEK-INF4210, UiO)

- Spring 1995, 1996: Perturbation methods (ME207, UiO)

- Spring 1997-2006: Numerical methods for partial differential equations (NMFPD/INF5620, UiO)

- Fall 1999-2006: Problem solving with scripting languages (IN228/INF3330, UiO)

- Spring 2004-2006: Advanced problem solving with scripting languages (INF5660, UiO)

- Fall 2007–: Introductory scientific programming (INF1100, UiO)

- Spring 2011, Fall 2012, Fall 2013: Numerical methods for partial differential equations (INF5620, UiO)

Publications, Talks, and Students

Books

[1] H. P. Langtangen. *Computational Partial Differential Equations - Numerical Methods and Diffpack Programming*. Lecture Notes in Computational Science and Engineering. Springer, 1999. 682 p.

[2] H. P. Langtangen. *Computational Partial Differential Equations - Numerical Methods and Diffpack Programming*. Texts in Computational Science and Engineering. Springer, second (significantly expaned and revised) edition, 2003. 855 p.

[3] H. P. Langtangen. *Python Scripting for Computational Science*. Texts in Computational Science and Engineering. Springer, third edition, 2008. 750 p.

[4] A. Tveito, X. Cai, H. P. Langtangen, and B. F. Nielsen. *Elements of Scientific Computing*. Texts in Computational Science and Engineering. Springer, 2010.

[5] H. P. Langtangen. *A Primer on Scientific Programming with Python*. Texts in Computational Science and Engineering. Springer, fourth edition, 2014. 792 p.

Edited Books

[6] E. Arge, A. M. Bruaset, and H. P. Langtangen, editors. *Modern Software Tools for Scientific Computing*. Birkhauser, 1997. 380 p.

[7] H. P. Langtangen, A. M. Bruaset, and E. Quak, editors. *Advances in Software Tools for Scientific Computing*. Lecture Notes in Computational Science and Engineering. Springer, 2000. 356 p.

[8] H. P. Langtangen and A. Tveito, editors. *Advanced Topics in Computational Partial Differential Equations - Numerical Methods and Diffpack Programming,*. Lecture Notes in Computational Science and Engineering, vol 33. Springer, 2003. 658 p.

Journal Papers

[9] H. P. Langtangen and A. Tveito. A numerical comparison of conjugate gradient-like methods. *Communications in Applied Numerical Methods*, 4:793–798, 1988.

[10] H. P. Langtangen. A method for smoothing derivatives of multilinear finite element fields. *Communications in Applied Numerical Methods*, 5:275–281, 1989.

[11] H. P. Langtangen. Conjugate gradient methods and ILU preconditioning of non-symmetric matrix systems with arbitrary sparsity patterns. *International Journal of Numerical Methods in Fluids*, 10:213–223, 1989.

[12] H. P. Langtangen. Implicit finite element methods for two-phase flow in oil reservoirs. *International Journal of Numerical Methods in Fluids*, 20:651–681, 1990.

[13] H. P. Langtangen. A general numerical solution method for Fokker-Planck equations with applications to structural reliability. *Probabilistic Engineering Mechanics*, 6(1):33–48, 1991.

[14] H. P. Langtangen. Sensitivity analysis of an enhanced oil recovery process. *Applied Mathematical Modelling*, 15:467–474, 1991.

[15] H. P. Langtangen, A. Tveito, and R. Winther. Instability of Buckley-Leverett flow in a heterogeneous medium. *Transport in Porous Media*, 9:165–185, 1992.

[16] H. P. Langtangen. Stochastic breakthrough time analysis of an enhanced oil recovery process. *SIAM Journal of Scientific and Statistical Computing*, 13:1394–1417, 1992.

[17] H. P. Langtangen. Numerical solution of first passage problems in random vibrations. *SIAM Journal of Scientific and Statistical Computing*, 15:997–996, 1994.

[18] A. M. Bruaset and H. P. Langtangen. Object-oriented design of preconditioned iterative methods in Diffpack. *ACM Transactions on Mathematical Software*, 23(1):50–80, 1997.

[19] H. Osnes and H. P. Langtangen. A study of some finite difference schemes for a uni-directional stochastic transport equation. *SIAM Journal of Scientific Computing*, 19(3):799–812, 1998.

[20] H. P. Langtangen, T. Marthinsen, and J. Mathisen. A comparison of methods for the statistics of slow-drift oscillations. *Probabilistic Engineering Mechanics*, 13(2):97–106, 1998.

[21] H. P. Langtangen and G. Pedersen. Computational methods for weakly dispersive and nonlinear water waves. *Computer Methods in Applied Mechanics and Engineering*, 160:337–358, 1998.

[22] E. Holm and H. P. Langtangen. A unified mesh refinement method with applications to porous media flow. *International Journal for Numerical Methods in Fluids*, 28:679–702, 1998.

[23] H. Osnes and H. P. Langtangen. An efficient probabilistic finite element method for stochastic groundwater flow. *Advances in Water Resources*, 22:185–195, 1998.

[24] X. Cai, H. P. Langtangen, B. F. Nielsen, and A. Tveito. A finite element method for fully nonlinear water waves. *Journal of Computational Physics*, 143:544–568, 1998.

[25] E. Holm and H. P. Langtangen. A unified finite element model for the injection molding process. *Computer Methods in Applied Mechanics and Engineering*, 178:413–429, 1999.

[26] E. Holm and H. P. Langtangen. A method for simulating sharp fluid interfaces in groundwater flow. *Advances in Water Resources*, 23:83–95, 1999.

[27] O. Munthe and H. P. Langtangen. Finite elements and object-oriented implementation techniques in computational fluid dynamics. *Computer Methods in Applied Mechanics and Engineering*, 190:865–888, 2000.

[28] H. P. Langtangen and O. Munthe. Solving systems of partial differential equations using object-oriented programming techniques with coupled heat and fluid flow as example. *ACM Transactions on Mathematical Software*, 27(1):1–26, 2001.

[29] H. P. Langtangen and G. Pedersen. Propagation of large destructive waves. *International Journal of Applied Mechanics and Engineering*, 7(1):187–204, 2002.

[30] H. P. Langtangen, K.-A. Mardal, and R. Winther. Numerical methods for incompressible viscous flow. *Advances in Water Resources*, 25:1125–1146, 2002. 25th Anniversary Special Issue.

[31] A. Kjeldstad, J. Skogseid, H. P. Langtangen, and K. Bjørlykke. Differential loading by prograding sedimentary wedges on continental margin: an arch forming mechanism. *Journal of Geophysical Research*, 108:2036–2056, 2003.

[32] K. Hinsen, H. P. Langtangen, O. Skavhaug, and Å. Ødegård. Using BSP and Python to simplify parallel programming. *Future Generation Computer Systems*, 22:123–147, 2006.

[33] X. Cai, P. V. Jeberg, and H. P. Langtangen. A numerical method for computing the profile of weld pool surfaces. *International Journal for Computational Methods in Engineering Science and Mechanics*, 6(2):115–125, 2005.

[34] L. I. Ingebrigtsen, T. K. Nilssen, H. P. Langtangen, and A. Tveito. On the accuracy of operator splitting for a fluid-structure interaction problem. *International Journal of Nonlinear Sciences and Numerical Simulation*, 4:209–218, 2004.

[35] S. Glimsdal, G. Pedersen, and H. P. Langtangen. An investigation of domain decomposition methods for one-dimensional dispersive long wave equations. *Advances in Water Resources*, 27:1111–1133, 2004.

[36] S. Glimsdal, G. Pedersen, K. Atakan, C. B. Harbitz, H. P. Langtangen, and F. Løvholt. Propagation of the Dec. 26, 2004 Indian Ocean Tsunami: effects of dispersion and source characteristics. *International Journal of Fluid Mechanics Research*, 33(1):15–43, 2006.

[37] X. Cai, G. Pedersen, and H. P. Langtangen. A parallel multi-subdomain strategy for solving the Boussinesq water wave equations. *Advances in Water Resources*, 28(3):215–233, 2005.

[38] X. Cai, H. P. Langtangen, and H. Moe. On the performance of the Python programming language for serial and parallel scientific computations. *Scientific Programming*, 13(1):31–56, 2005.

[39] S. Rahman, J. Gorman, C. H. W. Barnes, D. A. Williams, and H. P. Langtangen. Finite element analysis of a silicon-based double quantum dot structure. *Physical Review B*, 75, 2006. 233307.

[40] S. Rahman, J. Gorman, C. H. W. Barnes, D. A. Williams, and H. P. Langtangen. Numerical investigation of a piezoelectric surface acoustic wave interaction with a one-dimensional channel. *Physical Review B*, 74, 2006. 035308.

[41] K. Holmås and H. P. Langtangen. A sharp interface finite element method for elliptic interface problems; formulation and investigation in one space dimension. *International Journal of Pure and Applied Mathematics*, 34(3):287–312, 2007.

[42] S. Rahman, H. P. Langtangen, and C. H. W. Barnes. A finite element method for modelling electromechanical wave propagation in anisotropic piezoelectric media. *Communications in Computational Physics*, 2(2):271–292, 2007.

[43] S. Rahman, T. M. Stace, H. P. Langtangen, M. Kataoka, and C.H.W. Barnes. Pulse-induced acoustoelectric vibrations in surface-gated gaas-based quantum devices. *Physical Review B*, 75, 2007. 205303.

[44] H. Holmås T. Sira, M. Nordsveen, H. P. Langtangen, and R. Shulkes. Analysis of a 1d incompressible two-fluid model including artificial diffusion. *IMA Journal of Applied Mathematics*, 73:651–667, 2008.

[45] H. Holmås, D. Clamond, and H. P. Langtangen. A pseudospectral Fourier method for a 1D incompressible two-fluid model. *International Journal for Numerical Methods in Fluids*, 58:639–658, 2008.

[46] M. S. Alnæs, A. Logg, K.-A. Mardal, O. Skavhaug, and H. P. Langtangen. Unified framework for finite element assembly. *International Journal of Computational Science and Engineering*, 4:231–244, 2009.

[47] S. Linge, A. E. Løvgren, K.-A. Mardal, V. Haughton, and H. P. Langtangen. CSF flow dynamics at the cranio-vertebral junction studied with an idealized model of the subarachnoid space and computational flow analysis. *American Journal of Neuroradiology*, 31:185192, 2010.

[48] O. Al-Khayat, A. M. Bruaset, and H. P. Langtangen. A lumped particle modeling framework for simulating particle transport in fluids. *Communications in Computational Physics*, 8:115–142, 2010.

[49] J. K. Nilsen, X. Cai, B. Høyland, and H. P. Langtangen. Simplifying parallelization of scientific codes by a function-centric approach in Python. *Computational Science and Discovery*, 3, 2010. doi: 10.1088/1749-4699/3/1/015003.

[50] O. Al-Khayat, A. M. Bruaset, and H. P. Langtangen. Particle collisions in a lumped particle model. *Communications in Computational Physics*, 10:823–843, 2011.

[51] S. Linge, V. Haughton, A. E. Løvgren, K.-A. Mardal, A. Helgeland, and H. P. Langtangen. Effect of tonsilar herniation on cyclic CSF flow studied with computational flow analysis. *American Journal of Neuroradiology*, 32(5):1474–1481, 2011.

[52] J. B. Haga, H. Osnes, and H. P. Langtangen. Efficient block preconditioners for the coupled equations of pressure and deformation in highly discontinuous media. *International Journal of Analytical and Numerical Methods in Geomechanics*, 35(13):1466–1482, 2011. DOI: 10.1002/nag.973.

[53] J. B. Haga, H. Osnes, and H. P. Langtangen. On the causes of pressure oscillations in low-permeable and low-compressible porous media. *International Journal of Analytical and Numerical Methods in Geomechanics*, 2011. DOI: 10.1002/nag.1062.

[54] M. Mortensen, H. P. Langtangen, and G. N. Wells. A FEniCS-based programming framework for modeling turbulent flow by the Reynolds-averaged Navier-Stokes equations. *Advances in Water Resources*, 34(9), 2011. DOI: 10.1016/j.advwatres.2011.02.013.

[55] J. B. Haga, H. Osnes, and H. P. Langtangen. A parallel block preconditioner for large scale poroelasticity with highly heterogeneous material parameters. *Computational Geosciences*, 16(3):723–734, 2012. DOI: 10.1007/s10596-012-9284-4.

[56] O. Al-Khayat and H. P. Langtangen. Computational aspects of multiscale modeling with the lumped particle framework. *Communications in Computational Physics*, 12(4):1257–1274, 2012. DOI: 10.4208/cicp.110211.121211a.

[57] K. Valen-Sendstad, K.-A. Mardal, M. Mortensen, B. A. P. Reif, and H. P. Langtangen. Direct numerical simulation of transitional flow in a patient–specific intracranial aneurysm. *Journal of Biomechanics*, 44(16):2826–2832, 2011.

[58] K.-H. Støverud, K.-A. Mardal, V. Haughton, and H. P. Langtangen. CSF flow in Chiari I and syringomyelia from the perspective of computational fluid dynamics. *The Neuroradiology Journal*, (1):20–23, 2011.

[59] M. T. Sletholt, D. Pfahl, J. E. Hannay, and H. P. Langtangen. What do we know about agile practices in scientific software development? *Computing in Science and Engineering*, 14(2):24–37, 2011.

[60] S. Bikass, B. Andersson, A. Pilipenko, and H. P. Langtangen. Simulation of the distorion mechanisms due to non-uniform cooling in the aluminum extrusion process. *International Journal of Thermal Sciences*, 52:50–58, 2012.

[61] S. Bikass, B. Andersson, A. Pilipenko, and H. P. Langtangen. Simulation of initial cooling rate effect on the extrudate distortion in the aluminum extrusion process. *Applied Thermal Engineering*, 40:326–336, 2012.

[62] S. Bikass, B. Andersson, A. Pilipenko, and H. P. Langtangen. Spray footprint effect on the induced distortion by the cooling process in the aluminum extrusion process. *Applied Thermal Engineering*, 57:14–23, 2013. DOI:10.1016/j.applthermaleng.2013.03.036.

[63] K.-H. Støverud, V. Haughton, K.-A. Mardal, and H. P. Langtangen. CSF pressure and velocity in obstructions of the subarachnoid spaces. *The Neuroradiology Journal*, 26(2):218–226, 2013.

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[65] H. P. Langtangen. SISC redefined. *SIAM Journal on Scientific Computing*, 34(1), 2012. The Editor-in-Chief's description of the enlarged scope of the journal.

[66] C. Pradal, G. Varoquaux, and H. P. Langtangen. Publishing scientific software matters. *Journal of Computational Science*, 4(5), 2013.

Chapters in Books and Papers in Proceedings with Review

[67] H. P. Langtangen and G. Pedersen. Finite elements for the Boussinesq wave equations. In J. Grue, B. Gjevik, and J. E. Weber, editors, *Waves and Non-linear Processes in Hydrodynamics*, pages 117–126. Kluwer Academic Publishers, 1995.

[68] E. Haug and H. P. Langtangen. The basic equations in Eulerian continuum mechanics. In M. Dæhlen and A. Tveito, editors, *Numerical Methods and Software Tools in Industrial Mathematics*. Birkhauser, 1997.

[69] E. Gundersen and H. P. Langtangen. Finite element methods for two-phase flow in heterogeneous porous media. In M. Dæhlen and A. Tveito, editors, *Numerical Methods and Software Tools in Industrial Mathematics*. Birkhauser, 1997.

[70] E. Andreassen, E. Gundersen, E. Hinrichsen, and H. P. Langtangen. A mathematical model for the melt spinning of polymer fibers. In M. Dæhlen and A. Tveito, editors, *Numerical Methods and Software Tools in Industrial Mathematics*. Birkhauser, 1997.

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[74] E. Arge, A. M. Bruaset, P. B. Calvin, J. F. Kanney, H. P. Langtangen, and C. T. Miller. On the numerical efficiency of C++ in scientific computing. In M. Dæhlen and A. Tveito, editors, *Numerical Methods and Software Tools in Industrial Mathematics*. Birkhauser, 1997.

[75] A. M. Bruaset, E. Holm, and H. P. Langtangen. Increasing the efficiency and reliability of numerical software development. In E. Arge, A. M. Bruaset, and H. P. Langtangen, editors, *Modern Software Tools for Scientific Computing*. Birkhauser, 1997.

[76] A. M. Bruaset, H. P. Langtangen, and G. W. Zumbusch. Domain decomposition and multilevel methods in Diffpack. In P. Bjørstad, M. Espedal, and D. Keyes, editors, *Proceedings of the 9th Conference on Domain Decomposition*, 1997.

[77] H. P. Langtangen and A. Tveito. How should we prepare the students of science and technology for a life in the computer age? In B. Engquist and H. Schmid, editors, *Mathematics Unlimited - 2001 and Beyond*, pages 809–827. Springer, 2000.

[78] H. P. Langtangen and X. Cai. A software framework for easy parallelization of PDE solvers. In C. B. Jensen, T. Kvamsdal, H. I. Andersson, B. Pettersen, A. Ecer, J. Periaux, N. Satofuka, and P. Fox, editors, *Parallel Computational Fluid Dynamics*. North-Holland, 2001.

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[198] H. P. Langtangen and G. Pedersen. Simulation of weakly dispersive and nonlinear water waves. Talk at the *Symposium on Waves and Nonlinear Processes in Hydrodynamics*, Oslo, November 1994. Presented by H. P. Langtangen.

[199] H. P. Langtangen and G. Pedersen. Finite element methods for weakly nonlinear and dispersive water waves. Talk at the *Third SIAM Conference on Computational and Mathematical Issues in the Geosciences*, San Antonio, Texas, USA, February 1995. Presented by H. P. Langtangen.

[200] H. P. Langtangen. Statistical modeling of the breakthrough time function in reservoir simulation. Poster at the *Third SIAM Conference on Computational and Mathematical Issues in the Geosciences*, San Antonio, Texas, USA, February 1995.

[201] A. M. Bruaset and H. P. Langtangen. Generic software tools for PDEs. Invited minisymposium talk at *SIAM Annual Meeting*, Charlotte, North Carolina, USA, October 1995. Presented by A. M. Bruaset.

[202] J. O. Nygaard, J. Grue, H. P. Langtangen, and K. Mørken. On adaptive spline and wavelet methods for an integral formulation of inviscid flow. Talk at the *12th GAMM-Seminar Kiel on Boundary Elements: Implementation and Analysis of Advanced Algorithms*, Kiel, January 1996. Presented by J. O. Nygaard.

[203] A. M. Bruaset, H. P. Langtangen, and G. W. Zumbusch. Domain decomposition and multilevel methods in Diffpack. Talk at the *9th International Conference on Domain Decomposition Methods*, Ullensvang, Norway, June 1996. Presented by G. W. Zumbusch.

[204] E. Holm and H. P. Langtangen. Object-oriented implementation of adaptive mesh refinement. Talk at the conference *Grid Adaption in Computational PDEs: Theory and Applications*, Edinburgh, Scotland, July 1996. Presented by E. Holm.

[205] H. P. Langtangen and G. Pedersen. Numerical methods for prediction of tsunamis. Talk at the *XXV General Assembly of the ESC*, Reykjavik, Iceland, September 1996. Presented by H. P. Langtangen.

[206] A. M. Bruaset, E. Holm, and H. P. Langtangen. Increasing the efficiency and reliability of numerical software development. Talk at the *International Workshop for Modern Software Tools in Scientific Computing*, Oslo, Norway, September 1996. Presented by E. Holm.

[207] E. Arge, A. M. Bruaset, P. B. Calvin, J. F. Kanney, H. P. Langtangen, and C. T. Miller. Numerical efficiency of C++ in scientific computing. Poster at the *Conference on Advanced Simulation and Subsurface Flow and Transport*, North Carolina Supercomputing Center, Research Triangle Park, North Carolina, USA, December 1996. Presented by J. F. Kanney.

[208] H. P. Langtangen. The Diffpack software. Invited talk at *Workshop on PDE Software*, Institute of Mathematics and Its Applications, Minneapolis, Minnesota, USA, May 1997.

[209] J. Berge, H. Erlandsen, L. Ingebrigtsen, H. P. Langtangen, and H. Osnes. An environment for reservoir simulation. Talk at the *Fourth SIAM Conference on Computational and Mathematical Issues in the Geosciences*, Albuquerque, New Mexico, USA, June 1997. Presented by H. Erlandsen.

[210] A. M. Bruaset, L. Ingebrigtsen, and H. P. Langtangen T. Rusten. Software design for multi-phase flow problems. Talk at the *Fourth SIAM Conference on Computational and Mathematical Issues in the Geosciences*, Albuquerque, New Mexico, USA, June 1997. Presented by L. Ingebrigtsen.

[211] A. M. Bruaset, X. Cai, H. P. Langtangen, A. Tveito, and G. W. Zumbusch. Design issues and recent developments in Diffpack. Invited minsymposium talk at the *SIAM Annual meeting*, Stanford University, California, USA, July 1997. Presented by A. M. Bruaset.

[212] A. M. Bruaset, X. Cai, H. P. Langtangen, and A. Tveito. Diffpack: An object-oriented software environment for scientific computing. Invited minisymposium talk at the *Fourth US National Congress on Computational Mechanics*, San Fransisco, August 1997. Presented by X. Cai.

[213] A. M. Bruaset and H. P. Langtangen. Diffpack: A software environment for rapid prototyping of PDE solvers. Invited minisymposium talk at the *15th IMACS World Congress on Scientific Computation, Modelling and Applied Mathematics*, Berlin, Germany, August 1997. Presented by H. P. Langtangen.

[214] A. M. Bruaset, X. Cai, H. P. Langtangen, and A. Tveito. Numerical solution of PDEs on parallel computers utilizing sequential simulators. Talk at the *ISCOPE Conference 1997*, California, December 1997. Presented by X. Cai.

[215] H. P. Langtangen and G. Pedersen. A Lagrangian model for run-up of shallow water waves. Talk at the *10th International Conference on Finite Elements in Fluids*, Tucson, Arizona, USA, January 1998. Presented by H. P. Langtangen.

[216] H. P. Langtangen. Why object-oriented programming is useful in numerical applications; introduction to C++; object-oriented approaches to finite element solvers I and II; solving systems of PDEs by assembling independent solvers for each scalar PDE; parallelizing explicit finite difference schemes via domain decomposition and reuse of sequential solvers; parallelizing implicit solvers via domain decomposition and reuse of sequential solvers. Invited talks at the *Workshop on Object-Oriented Techniques for Finite Element Analysis and High-Performance Computing*, University of Umeå, Sweden, February 1998.

[217] H. P. Langtangen and G. Pedersen. Finite element models for tsunami simulation. Talk at the *International Conferance on Tsunamis*, Paris, France, May 1998. Presented by H. P. Langtangen.

[218] G. Pedersen and H. P. Langtangen. An analytic approach to tsunami modeling. Talk at the *International Conferance on Tsunamis*, Paris, France, May 1998. Presented by H. P. Langtangen.

[219] G. Pedersen and H. P. Langtangen. Effects of dispersion on generation and propagation of tsunamis. Talk at the *International Conferance on Tsunamis*, Paris, France, May 1998. Presented by G. Pedersen.

[220] X. Cai, H. P. Langtangen, and O. Munthe. An object-oriented software framework for building parallel Navier-Stokes solvers. Talk at *Parallel CFD'99*, Williamsburg, Virgina, USA, May 1999. Presented by X. Cai.

[221] H. P. Langtangen and G. Pedersen. Propagation of destructive flood waves. Talk at the *4th Annual ERCOFTAC Meeting of the Nordic Pilot Center*, Brekstad, Norway, August 1999. Presented by H. P. Langtangen.

[222] H. P. Langtangen. Advances in computational mechanics software. Keynote lecture at *The 12th NoACM Conference on Computational Mechanics*, Helsinki, Finland, October 1999.

[223] H. P. Langtangen and X. Cai. A software framework for easy parallelization of PDE solvers. Keynote lecture at the *Parallel CFD 2000 Conference*, Trondheim, Norway, May 2000. Presented by H. P. Langtangen.

[224] H. P. Langtangen and X. Cai. A software strategy for easy parallelization of sequential PDE solvers. Talk at the minisymposium on *Modern Software Aspects for PDE Solvers* (organized by H. P. Langtangen and Stefan Turek (University of Dortmund)) at the *IMACS 2000 Conference*, Lausanne, Switzerland, August 2000. Presented by H. P. Langtangen.

[225] K.-A. Mardal and H. P. Langtangen. An effective iterative approach to a fully implicit mixed finite element formulation for the Navier-Stokes equations. Talk at the *13th Nordic Seminar on Computational Mechanics*, Oslo, Norway, October 2000. Presented by K.-A. Mardal.

[226] H. P. Langtangen. Some efficiency considerations when using C++ and object-oriented programming in numerical codes. Invited minisymposium talk at the *GAMM 2001 Conference* in Zurich, Switzerland, February 2001.

[227] K.-A. Mardal, H. P. Langtangen, and R. Winther. An efficient parallel iterative approach to the time-dependent Stokes problem. Talk at the *Copper Mountain Conference*, Colorado, USA, April 2001. Presented by K.-A. Mardal.

[228] G. Pedersen and H. P. Langtangen. Propagation of large destructive waves (tsunamis). Talk at the *National Conference on Computational Mechanics (MekIT'01)*, Trondheim, Norway, May 2001. Presented by G. Pedersen.

[229] X. Cai and H. P. Langtangen. How modern programming techniques can greatly simplify the development of parallel simulation codes in computational mechanics. Talk at the *National Conference on Computational Mechanics (MekIT'01)*, Trondheim, Norway, May 2001. Presented by X. Cai.

[230] H. P. Langtangen. Rapid prototyping in multi-physics simulation. Keynote lecture at *Advanced Environments and Tools for High Performance Computing; EuroConference on Problem-Solving Environments for Numerical Mathematics, Science and Engineering Applications*, Castelvecchio Pascoli, Italy, June 2001.

[231] K.-A. Mardal and H. P. Langtangen. An efficient parallel iterative approach to a fully implicit mixed finite element formulation for the Navier-Stokes equations. Talk at the *ECCOMAS CFD 2001 Computational Fluid Dynamics Conference*, Swansea, Wales, September 2001. Presented by K.-A. Mardal.

[232] K.-A. Mardal and H. P. Langtangen. A software framework for mixed finite element programming. Talk at the *2nd International Conference on Computational Science*, Amsterdam, The Netherlands, April 2002. Presented by K.-A. Mardal.

[233] O. Skavhaug, K. Hinsen, and H. P. Langtangen. High-level scientific programming with Python. Talk at the *2nd International Conference on Computational Science*, Amsterdam, The Netherlands, April 2002. Presented by O. Skavhaug.

[234] X. Cai and H. P. Langtangen. Developing parallel object-oriented simulation codes in Diffpack. Invited talk at the *Fifth World Congress on Computational Mechanics*, Vienna, Austria, July 2002. Presented by X. Cai.

[235] H. P. Langtangen. Challenges in software development for multi-physics simulation. Invited minisymposium talk at the *2nd SIAM Computational Science and Engineering Conference*, San Diego, USA, February 2003.

[236] Å. Ødegård, H. P. Langtangen, K. Hinsen, and O. Skavhaug. High-level design of parallel libraries using Python and BSP. Talk at the workshop *Challenges for High-Performance Simulation and Science and Engineering*, Dagstuhl, Germany, March 2003. Presented by Å. Ødegård.

[237] H. P. Langtangen and O. Skavhaug. A first step towards automatic PDE code verification. Talk at the workshop *Challenges for High-Performance Simulation and Science and Engineering*, Dagstuhl, Germany, March 2003. Presented by H. P. Langtangen.

[238] K.-A. Mardal, A. Huerta, H. P. Langtangen, and D. Harry. Numerical modeling of crust and mantle movement. Talk presented at *SIAM Conference on Mathematical and Computational Issues in the Geosciences* (GS0 3), Austin, Texas, USA, March 2003. Presented by K.-A. Mardal.

[239] K.-A. Mardal, H. P. Langtangen, and R. Winther. Error estimates for the linear Navier-Stokes equations. Talk at the *Second National Conference on Computational Mechanics (MekIT'03)*, Trondheim, Norway, May 2003. Presented by K.-A. Mardal.

[240] M. Huseby and H. P. Langtangen. Modeling propagation of noise over three-dimensional terrains. Talk at the *Second National Conference on Computational Mechanics (MekIT'03)*, Trondheim, Norway, May 2003. Presented by M. Huseby.

[241] P. V. Jeberg, X. Cai, H. Holm, and H. P. Langtangen. A flexible architecture for welding simulators used in weld planning. Talk at the *International Conference on Productive Welding in Industrial Applications*, Lappenranta, Finland, May 2003. Presented by P. V. Jeberg.

[242] H. P. Langtangen and A. M. Bruaset. The history and philosophy of Diffpack. Invited minisymposium talk at the *21st CAD-FEM User's Meeting*, Potsdam, Germany, November 2003. Presented by H. P. Langtangen.

[243] A. M. Bruaset and H. P. Langtangen. Future development of Diffpack at Simula. Invited minisymposium talk at the *21st CAD-FEM User's Meeting*, Potsdam, Germany, November 2003. Presented by A. M. Bruaset.

[244] T. Akbay, A. M. Bruaset, and H. P. Langtangen. A multi-physics solid oxide fuel cell simulator as a Diffpack application. Invited minisymposium talk at the *21st CAD-FEM User's Meeting*, Potsdam, Germany, November 2003. Presented by A. M. Bruaset.

[245] H. P. Langtangen. Stochastic ordinary differential equations and deterministic partial differential equations – on the relation between quantum mechanics and other fields of science. Lecture at the workshop *Computational Methods for the Time-Dependent Schrödinger Equation* at the Center of Excellence *Mathematics for Applications* (CMA), Oslo, Norway, November 2003.

[246] M. Huseby, H. P. Langtangen, and D. E. Reksten. A three-dimensional model for noise propagation over realistic terrain. Talk at the *27th Scandinavian Symposium on Physical Acoustics, Ustaoset, Norway*, January 2004. Presented by M. Huseby.

[247] M. Westlie, K.-A. Mardal, and H. P. Langtangen. Making a Python interface to the C++ library Diffpack. Talk at the *EuroPython 2004 Conference*, Gothenburg, Sweden, June 2004. Presented by M. Westlie.

[248] R. Geus, O. Skavhaug, and H. P. Langtangen. Python wrapper tools; a performance study. Talk at the *EuroPython 2004 Conference*, Gothenburg, Sweden, June 2004. Presented by R. Geus.

[249] Å. Ødegård, K.-A. Mardal, P. Miller, H. Moe, O. Skavhaug, A. M. Bruaset, and H. P. Langtangen. High performance computing in Python. Tutorial at the *SC2004 Conference*, Pittsburg, USA, November 2004. Presented by Ødegård, Moe, Mardal, Miller, and Skavhaug.

[250] X. Cai, G. Pedersen, and H. P. Langtangen. Solving Boussinesq water wave equations on parallel computers. Talk at the *International Workshop on Numerical Ocean Modeling*, Oslo, Norway, January 2005.

[251] H. P. Langtangen, X. Cai, and H. Moe. On the efficiency of serial and parallel Python-driven codes. Minisymposium talk at the *3rd SIAM Computational Science and Engineering Conference*, Orlando, USA, February 2005. Presented by H. P. Langtangen.

[252] S. Glimsdal, G. K. Pedersen, V. Shuvalov, H. Dypvik, H. P. Langtangen, and Ø. Kristiansen. Tsunami generated by the Mjølnir impact. Poster at the *Lunar and Planetary Science Conference XXXVI*, February 2005. Presented by S. Glimsdal.

[253] O. Skavhaug and H. P. Langtangen. A basic introduction to Python. Invited Lecture at the Department of Information Technology, Uppsala University, Sweden, April 2005. Presented by O. Skavhaug.

[254] H. P. Langtangen. Tsunamis generated by earth-asteroid impacts. Invited talk at the *Launch of the EU-project CENS-CMA* at the Center of Excellence *Mathematics for Applications* (CMA), Oslo, Norway, May 2005.

[255] K. Holmås, J. Nossen, D. Mortensen, R. Schulkes, and H. P. Langtangen. Simulation of wavy stratified two-phase flow using computational dynamics (CFD). Talk at the *12th International Conference on Multiphase Productionc Technology '05*, Barcelona, Spain, May 2005. Presented by K. Holmås.

[256] K. Holmås, D. Mortensen, J. Nossen, R. Schulkes, and H. P. Langtangen. Simulation of two-phase fluid flow using both the level-set and the volume of fluid methods. Talk at the *4th International Conference on CFD in the Oil and Gas, Metallurgical & Process Industries*, Trondheim, Norway, June 2005. Presented by K. Holmås.

[257] X. Cai, G. Pedersen, H. P. Langtangen, and S. Glimsdal. Parallel simulation of tsunamis using a hybrid software approach. Talk at the *International Conference on Parallel Computing (ParCo) 2005*, Malaga, Spain, September 2005. Presented by X. Cai.

[258] A. M. Bruaset, M. S. Alnæs, H. P. Langtangen, K.-A. Mardal, H. Moe, O. Skavhaug, and Å. Ødegård. Scientific computing in Python. Tutorial at the *ASIM conference*, Munich, Germany, September 2005. Presented by M. S. Alnæs and K.-A. Mardal.

[259] H. P. Langtangen. Tools for multi-physics simulation. Invited talk at the *FEniCS'05 workshop*, Toyota Technological Institute, Chicago, USA, October 2005.

[260] H. P. Langtangen. Tsunamis generated by earth-asteroid impacts. Invited talk at the *BeMatA* (Computational Mathematics for Applications) meeting, Hurdalsjøen, Norway, October 2005.

[261] H. P. Langtangen. Solution of partial differential equations on parallel computers. Lecture at the workshop *High-Performance Computing in Physics* at the Center of Excellence *Mathematics for Applications* (CMA), Oslo, Norway, November 2005.

[262] H. P. Langtangen. Tsunami simulations and their need for computational power. Invited lecture at the Dagstuhl conference *Architectures and Algorithms for Petascale Computing*, Dagstuhl, Germany, February 2006.

[263] H. P. Langtangen. Simulation of tsunamis generated by earth-asteroid collisions. Invited keynote lecture at the conference *High-Performance Scientific Computing – Modeling, Simulation and Optimization of Complex Processes*, Hanoi, Vietnam, March 2006.

[264] H. P. Langtangen and K.-A. Mardal. Mathematical modeling of blood flow. 5 hours lecture at the European Mathematical Society Summer School *Mathematical Modeling of the Heart*, Longyearbyen, Svalbard, Norway, May 2006.

[265] H. P. Langtangen and Joakim Sundnes. Introduction to heart muscle mechanics – basic concepts of muscle contraction and soft tissue mechanics. 6 hours lecture at the European Mathematical Society Summer School *Mathematical Modeling of the Heart*, Longyearbyen, Svalbard, Norway, May 2006. Presented by J. Sundnes.

[266] S. Glimsdal, G. K. Pedersen, H. P. Langtangen, V. Shuvalov, and H. Dypvik. Tsunami generation and propagation from the Mjølnir asteroid impact. Poster at the conference *Impact craters as indicators for planetary environmental evolution and astrobiology*, Östersund, Sweden, June 2006. Presented by H. Dypvik.

[267] M. S. Alnæs, A. M. Bruaset, X. Cai, H. P. Langtangen, K.-A. Mardal, H. Moe, O. Skavhaug, and Å. Ødegård. High-performance computing in Python. One-day tutorial at *PARA'06: State-of-the-art in Scientific and Parallel Computing*, Umeå, Sweden, June 2006. Presented by H. P. Langtangen, X. Cai, and K.-A. Mardal.

[268] H. P. Langtangen. Mixed-language programming for HPC applications. Invited keynote lecture at *PARA'06: State-of-the-art in Scientific and Parallel Computing*, Umeå, Sweden, June 2006.

[269] X. Cai and H. P. Langtangen. Making hybrid tsunami simulators in a parallel software framework. Talk at the minisymposium *Software Tools for Parallel CFD Applications*, organized by X. Cai and H. P. Langtangen, at the conference *PARA'06: State-of-the-art in Scientific and Parallel Computing*, Umeå, Sweden, June 2006. Presented by X. Cai.

[270] H. P. Langtangen. Building programmable problem solving environments for porous media flow. Invited keynote lecture at the international conference on *Computational Methods in Water Resources, CMWR – XVI*, Copenhagen, Denmark, June 2006.

[271] H. P. Langtangen. An overview of mathematical modeling and numerical simulation. Invited talk at the *Oslo School of Architecture and Design*, October 2006.

[272] H. P. Langtangen. Why simulate? Invited plenary talk at the *Norwegian Defence Research Establishment* (FFI), November 2006.

[273] H. P. Langtangen. Using Python to build programmable problem solving environments. Invited talk at the *Norwegian Defence Research Establishment* (FFI), November 2006.

[274] H. P. Langtangen. Modeling tsunamis originating from earth-asteroid collisions. Invited talk at the *Center of Excellence for Nonlinear Science (CENS)*, Tallin, Estonia, November 2006.

[275] H. Enger, J. Feder, A. Malthe-Sørenssen, and H. P. Langtangen. Optimal coupling in a multiscale model. Poster at the *Kongsberg Seminar* on geology, Kongsberg, Norway, May 2007. Presented by H. Enger.

[276] H. Holmås, D. Clamond, and H. P. Langtangen. A pseudospectral Fourier method applied to an incompressible two-fluid model. Talk at the *International Conference on Multiphase Flow, ICMF 2007*, Leipzig, Germany, July 2007. Presented by H. Holmås.

[277] H. P. Langtangen. Computational modeling of huge tsunamis from asteroid impacts. Invited keynote lecture at the *International conference on Computational Science 2007 (ICCS'07)*, Beijing, China, May 2007.

[278] R. E. Bredesen, G. Pedersen, and H. P. Langtangen. Benchmark of a tsunami run-up code. Talk at the *Fourth National Conference on Computational Mechanics (MekIT'07)*, Trondheim, Norway, May 2007. Presented by R. E. Bredesen.

[279] O. Al-Khayat, A. M. Bruaset, and H. P. Langtangen. Lattice Boltzmann methods and turbidity flow modeling. Talk at the *Fourth National Conference on Computational Mechanics (MekIT'07)*, Trondheim, Norway, May 2007. Presented by O. Al-Khayat.

[280] J. B. Haga, A. M. Bruaset, X. Cai, H. P. Langtangen, H. Osnes, and J. Skogseid. Parallelisation and numerical performance of a 3d model for coupled deformation, fluid flow, and heat transport in porous geological formations. Talk at the *Fourth National Conference on Computational Mechanics (MekIT'07)*, Trondheim, Norway, May 2007. Presented by J. B. Haga.

[281] O. Al-Khayat, A. M. Bruaset, and H. P. Langtangen. Numerical modeling of turbidity flow with the Lattice Boltzmann Method. Talk at the *Computational Geoscience Workshop* at Simula, Norway, June 2008. Presented by O. Al-Khayat.

[282] O. Al-Khayat, A. M. Bruaset, and H. P. Langtangen. A coupled Lattice Boltzmann Model for a turbulent sand-laden fluid flow. Talk at the *17th Discrete Simulation of Fluid Dynamics (DSFD) conference*, Florianopolis, Brazil, July 2008. Presented by O. Al-Khayat.

[283] O. Al-Khayat, T. Løseth, A. M. Bruaset, and H. P. Langtangen. Particle-based methods in the modelling of turbidity currents and turbidites. Talk at the *33rd IGC Congress*, Oslo, Norway, August 2008. Presented by O. Al-Khayat.

[284] H. P. Langtangen and A. Logg. Trends in computational mechanics software. Invited keynote lecture at the *21st Nordic Seminar on Computational Mechanics (NSCM-21)*, Trondheim, Norway, October 2008. Presented by H. P. Langtangen.

[285] A. E. Løvgren, S. Linge, K.-A. Mardal, V. Haughton, and H. P. Langtangen. CFD analysis of cerebrospinal fluid flow in the cranio-cervical region. Talk at the *21st Nordic Seminar on Computational Mechanics (NSCM-21)*, Trondheim, Norway, October 2008. Presented by A. E. Løvgren.

[286] S. Linge, A. E. Løvgren, K.-A. Mardal, V. Haughton, and H. P. Langtangen. Cerebrospinal fluid flow investigations with modelling and simulation. Invited talk at the *The Chiari Institute*, New York, USA, January 2009. Presented by S. Linge.

[287] S. Linge, A. E. Løvgren, K.-A. Mardal, V. Haughton, and H. P. Langtangen. Simulating normal and abnormal CSF flow with idealized geometries. Invited talk at a *Seminar on Cerebrospinal Fluid Flow*, University of Wisconsin, USA, January 2009. Presented by S. Linge.

[288] H. P. Langtangen. Python as an important tool in a major science education reform. Invited talk at Telemark College, Engineering Faculty, Porsgrunn, Norway, February 2009.

[289] H. P. Langtangen. Techniques for achieving high performance in numerical Python codes. Invited talk at Telemark College, Engineering Faculty, Porsgrunn, Norway, February 2009.

[290] H. P. Langtangen. Experience with Python in a major educational reform. Minisymposium talk at the *SIAM Conference on Computational Science and Engineering*, Miami, USA, March 2009.

[291] S. Linge, A. E. Løvgren, K.-A. Mardal, V. Haughton, and H. P. Langtangen. Effect of tonsilar position on cerebrospinal fluid flow in the spinal subarachnoid space studied with computational fluid dynamics. Talk at the *the ASNR 47th Annual Meeting*, Vancouver, Canada, January 2009. Presented by S. Linge.

[292] J. B. Haga, H. P. Langtangen, B. F. Nielsen, and H. Osnes. On the performance of an algebraic multigrid preconditioner for the pressure equation with highly discontinuous media. Talk at the *Fifth National Conference on Computational Mechanics (MekIT'09)*, Trondheim, Norway, May 2009. Presented by J. B. Haga.

[293] I. Wilbers, H. P. Langtangen, and Å. Ødegård. Using Cython to speed up numerical Python programs. Talk at the *Fifth National Conference on Computational Mechanics (MekIT'09)*, Trondheim, Norway, May 2009. Presented by J. B. Haga.

[294] K. Valen-Sendstad, M. Mortensen, H. P. Langtangen, B. A. Pettersson Reif, and K.-A. Mardal. Implementing a k-ϵ turbulence model in the FEniCS finite element programming environment. Talk at the *Fifth National Conference on Computational Mechanics (MekIT'09)*, Trondheim, Norway, May 2009. Presented by J. B. Haga.

[295] S. Linge, A. E. Løvgren, K.-A. Mardal, V. Haughton, and H. P. Langtangen. Simulating the Chiari I malformation. Talk at the seminar *Engineering Methods in Medicine*, Telemark University College, Porsgrunn, Norway, October 2009. Presented by S. Linge.

[296] H. P. Langtangen. Experience with merging mathematics, numerical methods, physics and programming from day one. Talk at the seminar *Engineering Methods in Medicine*, Telemark University College, Porsgrunn, Norway, October 2009.

[297] H. P. Langtangen. Modeling and simulation. Talk for the Tekna labor union, Oslo, Norway, November 2009.

[298] K.-A. Mardal, S. Hentschel, A. Helgeland, H. P. Langtangen, S. Linge, A. E. Løvgren, A. Logg, and K. Valen-Sendstad. Patient-specific simulations of stroke and syringomyelia. Talk at Advisory Commitee Meeting for FFI project P1112 *Aerosols: Dispersion, Transport and Consequences*, Kjeller, Norway, November 2009. Presented by K.-A. Mardal.

[299] K.-A. Mardal, V. Haughton, S. Hentschel, H. P. Langtangen, S. Linge, A. E. Løvgren, and K. Valen-Sendstad. CSF flow modelling. Invited talk at the CSR Flow Research Conference, University of Wisconsin, USA, November 2009. Presented by K.-A. Mardal.

[300] H. P. Langtangen and X. Cai. HPC needs for biomedical flows and productivity of future computational scientists. Invited talk at the National Seminar on Future Needs for eInfrastructure in Norway, March 2010. Presented by H. P. Langtangen and X. Cai.

[301] H. P. Langtangen. Python and HPC. Invited keynote talk at the NOTUR 2010 Supercomputing conference, Bergen, Norway, May 2010.

[302] K.-H. Støverud, K.-A. Mardal, and H. P. Langtangen. From a physical problem to computer simulations. Talk at the Workshop on Cerebrospinal Fluid Flow in the Brain and Spinal Canal - Clinical, Experimental and Mathematical Models and Problems, Center for Biomedical Computing, Simula Research Laboratory, Norway, May 2010. Presented by K.-H. Støverud.

[303] H. P. Langtangen. Computational modelling of huge tsunamis from asteroid impacts. Talk at the CBC Workshop on Tsunami Modeling, Simula, Norway, June 2010.

[304] H. P. Langtangen. What has happened in the numerous disastrous earth-asteroid collisions? Invited talk at Oslo University Hospital, Rikshospitalet, June 2010.

[305] H. P. Langtangen. Increasing the level and understanding of mathematics through computations. Invited talk at Southern Denmark University, Department of Mathematics and Computer Science, Odense, Denmark, June 2010.

[306] H. P. Langtangen. Gluing mathematics, numerics, and physics in an introductory programming course. Invited talk at the *CCP 2010 Conference on Computational Physics*, Trondheim, Norway, June 2010.

[307] H. P. Langtangen. Using python to advance teaching and research. Invited keynote talk at the EuroSciPy conference, Paris, France, July 2010.

[308] K.-H. Støverud, K.-A. Mardal, V. Haughton, and H. P. Langtangen. Cerebrospinal fluid (CSF) - oscillating flow and pressure. Talk at the Workshop on Aerosols: Dispersion, Transport and Effects, Center for Biomedical Computing, Simula Research Laboratory, Norway, November 2010. Presented by K.-H. Støverud.

[309] K.-H. Støverud, K.-A. Mardal, V. Haughton, and H. P. Langtangen. CSF hydrodynamic in patients with syringomyelia and Chiari I malformations. Talk at the NUPUS (Nonlinearities and Upscaling in Porous Media) Meeting, Freudenstadt, Germany, May 2010. Presented by K.-H. Støverud.

[310] K. Valen-Sendstad, K.-A. Mardal, M. Mortensen, H. P. Langtangen, and B. A. P. Reif. Methodology for cerebral blood flow. Talk at Biomedical Simulation Lab, Institute of Biomaterials and Biomedical Engineering, University of Toronto, March 2011. Presented by K. Valen-Sendstad.

[311] H. P. Langtangen. Abnormal flows in the brain and the spine: how to better understand diseases by computations. Talk at the Computational Life Science seminar, University of Oslo, April 2011.

[312] H. P. Langtangen. Kaos i hjernen – ny innsikt gjennom simuleringer (English title: Chaos in the brain – new insight through simulations). Talk at Fysikkforeningen, University of Oslo, April 2011.

[313] H. P. Langtangen. Kaos i hjernen – ny innsikt gjennom simuleringer (English title: Chaos in the brain – new insight through simulations). Talk at the University of Oslo 1-day seminar *Realister invaderer helsevesenet*, May 2011.

[314] K. Valen-Sendstad, K.-A. Mardal, M. Mortensen, B. A. Pettersson Reif, and H. P. Langtangen. Large eddy simulations of stationary flow in patient–specific MCA aneurysms. Talk at the *Sixth National Conference on Computational Mechanics (MekIT'11)*, Trondheim, Norway, May 2011. Presented by K. Valen-Sendstad.

[315] K.-H. Støverud, K.-A. Mardal, H. P. Langtangen, and V. Haughton. The effect of varying cross-sectional areas on cerebrospinal fluid flow and pressure in the cervical spine. Talk at the *Sixth National Conference on Computational Mechanics (MekIT'11)*, Trondheim, Norway, May 2011. Presented by K.-H. Støverud.

[316] M. Mortensen, H. P. Langtangen, and J. Myre. CBC.RANS – a new flexible, programmable software framework for computational fluid dynamics. Talk at the *Sixth National Conference on Computational Mechanics (MekIT'11)*, Trondheim, Norway, May 2011. Presented by M. Mortensen.

[317] K. Valen-Sendstad, K.-A. Mardal, M. Mortensen, B. A. P. Reif, and H. P. Langtangen. Why blood flow in the vicinity of aneurysms is difficult to compute. Talk at Workshop on Key Topics in the Center for Biomedical Computing, Simula Research Laboratory, Norway, August 2011. Presented by K. Valen-Sendstad.

[318] H. P. Langtangen. Hvorfor får kvinner oftere hjerneslag enn menn? (English title: Why are women more subjected to stroke than men?). Talk at REAL frokost, Realistforeningen, University of Oslo, September 2011.

[319] K. Valen-Sendstad, K.-A. Mardal, M. Mortensen, H. P. Langtangen, B. A. P. Reif, and D. A. Steinman. 'turbulence' in cerebral aneurysms. Talk at Workshop on Biomechanics, Center for Biomedical Computing, Simula Research Laboratory, Norway, November 2011. Presented by K. Valen-Sendstad.

[320] H. P. Langtangen and M. Mortensen. Flexible specification of large systems of nonlinear PDEs. Keynote talk at *2nd $[HPC]^3$ Workshop* at KAUST, February 5-8, Saudi-Arabia, February 2012. Presented by H. P. Langtangen.

[321] H. P. Langtangen, K. Valen-Sendstad, K.-A. Mardal, and M. Mortensen. Hvorfor får kvinner oftere hjerneslag enn menn? (English title: Why are women more subjected to stroke than men?). Talk at the opening of Realistforeningen's "kjeller", University of Oslo, March 2012. Presented by H. P. Langtangen.

[322] K.-A. Mardal, H. P. Langtangen, and P. Røtnes. Er zombier en trussel mot menneskeheten? (English title: Are zombies a threat to mankind?). Talk at the opening of Realistforeningen's "kjeller", University of Oslo, March 2012. Presented by K.-A. Mardal.

[323] K.-A. Mardal and H. P. Langtangen. Will FEniCS fly? Talk at the *FEniCS'12 Workshop*, Simula Research Laboratory, Oslo, June 2012. Presented by K.-A. Mardal.

[324] H. P. Langtangen and M. Mortensen. Flexible software tools for computational turbulence. Invited keynote lecture at the *25th Nordic Seminar on Computational Mechanics (NSCM-25)*, Lund, Sweeden, October 2012. Presented by H. P. Langtangen.

[325] H. P. Langtangen. Bringing flow simulations to the clinic. Invited lecture at the Scientific Computing and Imaging Institute (SCI Institute), University of Utah, USA, March 2013.

[326] K.-H. Støverud, K.-A. Mardal, H. P. Langtangen, and V. Haughton. Effect of oscillatory cerebrospinal fluid pressure on fluid movement in the spinal cord. Talk at the *Seventh National Conference on Computational Mechanics (MekIT'13)*, Trondheim, Norway, May 2013. Presented by K.-H. Støverud.

[327] J. Feinberg and H. P. Langtangen. Uncertainty quantification of diffusion in layered media by a new method based on polynomial chaos expansion. Talk at the *Seventh National Conference on Computational Mechanics (MekIT'13)*, Trondheim, Norway, May 2013. Presented by J. Feinberg.

[328] H. P. Langtangen. Building simulation software for the next decade: Tools and trends. Keynote talk at the *International Workshop on Mantle and Litosphere Dynamics*, Klækken hotel, Norway, September 2013.

[329] V. Eck, J. Feinberg, H. P. Langtangen, and L. R. Hellevik. Assessment of statistical variability in material parameters for 1D wave propagation in arterial networks. Talk at the *3rd International Conference on Computational and Mathematical Biomedical Engineering*, Hong Kong, December 2013. Presented by V. Eck.

[330] H. P. Langtangen. How to easily implement sophisticated tailored algorithms in computational turbulence. Invited talk at the Department of Mathematics, University of Oxford, UK, February 2014.

Supervised MSc Students

[331] Jan Martin Holwech. Deformation of porous elastic viscoplastic materials with fluid flow. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1987. Joint work with Philip D. Mitusch.

[332] Philip D. Mitusch. Deformation of porous elastic viscoplastic materials with fluid flow. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1987. Joint work with Jan Martin Holwech.

[333] Stein Tenden. Elementmetode for geometrisk ikke-lineære materialer i tre dimensjoner anvendt på styrkeberegning av viskoelastiske materialer med en elastisk modell. English title: Finite Element Methods for Geometrically Nonlinear Materials in Three Dimensions, Applied to Structural Analysis of Viscoelastic Materials Approximated by an Elastic Model. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1987.

[334] Styrk Finne. Linear and nonlinear analysis of viscoelastic materials using the finite element method. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1989. Joint work with Cecilia Futsaether.

[335] Cecilia Futsaether. Linear and nonlinear analysis of viscoelastic materials using the finite element method. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1989. Joint work with Styrk Finne.

[336] Tine Bauck Irmann-Jacobsen. Løsning av Boussinesq-likningene ved hjelp av elementmetoden. English title: Solution of the Boussinesq Equations by the Finite Element Method. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1989. Jointly supervised with Geir Pedersen, Department of Mathematics, University of Oslo.

[337] Harald Osnes. Løsning of Euler-likningene for kompressible fluider ved hjelp av elementmetoden. English title: Solution of the Euler Equations for Compressible Fluids by the Finite Element Method. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1991. Jointly supervised with Jan Ivar Botnan, Norwegian Defense Research Establishment (FFI).

[338] Eyvind B. Ellingsen. Gruntvannslikningene diskretisert med elementmetoden. English title: The Shallow Water Equations Discretized by the Finite Element Method. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1991.

[339] Gunnar Pedersen. Preprosessor for elementmetoden. English title: Preprocessor for the Finite Element Method. Cand. scient. thesis, Department of Informatics, University of Oslo, 1993.

[340] Ove Johan Foss. Effektivisering av elementmetoden ved optimalisering av grid. English title: Increasing the Efficiency of the Finite Element Method by Optimizing the Grid. Cand. scient. thesis, Department of Informatics, University of Oslo, 1993.

[341] B. Heidi Rustad. Spin-down i ikke-newtonske fluider. English title: Spin-Down in Non-Newtonian Fluids. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1994.

[342] Hilde Cathrine Gravdahl Vølstad. Programvare for matematiske modeller i økologi. English title: Software for Mathematical Models in Ecology. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1994. Jointly supervised with Niels Christian Stenseth, Department of Biology, University of Oslo.

[343] Xing Cai. Visualization of vector fields and spline applications in differential equations. Cand. scient. thesis, Department of Informatics, University of Oslo, 1994.

[344] Roger Olafsen. Visualisering og animering av store element-metode-løsninger. English title: Visualization and Animation of Large Finite Element Solutions. Cand. scient. thesis, Department of Informatics, University of Oslo, 1994.

[345] Unn Elisabeth Gundersen. An investigation of some finite element methods for two-phase porous media flow. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1995.

[346] Jacob N. Ingwersen. Responsmodellering for partielle differensialligninger. English title: Response Modelling for Partial Differential Equations. Cand. scient. thesis, Department of Informatics, University of Oslo, 1995.

[347] Otto Munthe. Modellering av pulserende strømning av blod gjennom de store blodårene. English title: Modeling of Pulsating Blood Flow through the Major Arteries. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1996.

[348] Unni M. Kolderup. Numerical solution of the Boussinesq equations. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1996. Jointly supervised with Geir Pedersen, Department of Mathematics, University of Oslo.

[349] Hilde Norma Lund. Noen anvendelser og utvidelser av Diffpack. English title: Some Applications and Extensions of Diffpack. Cand. scient. thesis, Department of Informatics, University of Oslo, 1996.

[350] Fred Ivar Larsen. Visualiserings-teknikker for skalar- og vektor-felt. English title: Visualization Techniques for Scalar and Vector Fields. Cand. scient. thesis, Department of Informatics, University of Oslo, 1997.

[351] Lene Linnerud. Vortex-metoder som korreksjon til frontfølgingsmetoder. English title: Vortex Methods as a Correction to Front Tracking Methods. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1997. Jointly supervised with Tore Gimse, SINTEF Applied Mathematics, and Jan Trulsen, Department of Astrophysics, University of Oslo.

[352] Kathrine Frey. Ikke-lineær bayesiansk regresjon med anvendelse i mekanikk. English title: Nonlinear Bayesian Regression with Applications to Mechanics. Cand. scient. thesis, Statistics Division, Department of Mathematics, University of Oslo, 1997. Jointly supervised with Erik Bølviken, Department of Mathematics, University of Oslo.

[353] Elizabeth Acklam. A parallel programming environment for finite difference methods. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1997. Jointly supervised with Geir Pedersen, Department of Mathematics, University of Oslo.

[354] Anders Jacobsen. An efficient solver for the 3D Navier-Stokes equations. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1998.

[355] Kaare A. Sørensen. A general approach for compressible and incompressible cfd. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1998.

[356] Joakim Sundnes. En trekanbasert mixed finite element - finite volume metode for tofasestrøm i et porøst medium. English title: A Triangle-Based Mixed Finite Element – Finite Volume Method for Two-Phase Flow in a Porous Medium. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1998. Jointly supervised with Magnus Wangen, Institute for Energy Technology (IFE).

[357] Kent-Andre Mardal. Mixed finite elements; general software and fast iterative solvers. Cand. scient. thesis, Department of Informatics, University of Oslo, 1998. Jointly supervised with Ragnar Winther, Department of Informatics, University of Oslo.

[358] Trygve Kastberg Nilssen. Energy minimization. Cand. scient. thesis, Department of Informatics, University of Oslo, 1998. Mainly supervised by Ragnar Winther, Department of Informatics, University of Oslo.

[359] Håvard Semb. Programming Diffpack preprocessors. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1999.

[360] Arild Kjeldstad. A coupled deformation-flow-heat model for basin modeling. Cand. scient. thesis, Department of Geology, University of Oslo, 1999. Jointly supervised with Olav Eldholm, Deptartment of Geology, University of Oslo, and Jacob Skogseid, Norsk Hydro.

[361] Rasmus Bording. High Quality Visualization with RenderMan. Cand. scient. thesis, Department of Informatics, University of Oslo, 2001. Jointly supervised with Xing Cai and Glenn Terje Lines, Department of Informatics, University of Oslo.

[362] Roger Hansen. Scripting and high-performance computing. Cand. scient. thesis, Department of Informatics, University of Oslo, 2001.

[363] Ingebjørg Kåsen. Mixed and classical finite element methods for the Navier-Stokes equations. Cand. scient. thesis, Department of Informatics, University of Oslo, 2001.

[364] Harald Berge. Programmering av en Navier-Stokes løser og kobling med en energiligningsløser. English title: Programming of a Navier-Stokes solver and coupling with an energy equation solver. Cand. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 2002.

[365] Karl Erik Levik. Q-morph – implementing a quadrilateral meshing algorithm. Siv.ing. thesis, Department of Informatics, University of Oslo, 2002.

[366] Gunnar Sletta. Visualization of scientific datasets obtained from parallel simulation. Cand. scient. thesis, Department of Informatics, University of Oslo, 2002. Jointly supervised with Xing Cai (main supervisor), Department of Informatics, University of Oslo.

[367] Bjørn Egil Jenssen. Voxelbasert 3D visualisering i OpenGL. English title: Voxel-Based 3D Visualization in OpenGL. Cand. scient. thesis, Department of Informatics, University of Oslo, 2003.

[368] Håvard Wall. Optimalisering av parallelle Diffpack simuleringer. English title: Optimization of Parallel Diffpack Simulations. Cand. scient. thesis, Department of Informatics, University of Oslo, 2003. Jointly supervised with Xing Cai (main supervisor), Department of Informatics, University of Oslo.

[369] Ståle Wåge Pedersen. Simulation of rigid body dynamics. Cand. scient. thesis, Department of Informatics, University of Oslo, 2003.

[370] Siri Spjelkavik. SIC - A Version Control System. Cand. scient. thesis, Department of Informatics, University of Oslo, 2003.

[371] Morten Wang Fagerland. Creating interactive, dynamic, visual illustrations for teaching with high-level software tools. Cand. scient. thesis, Department of Informatics, University of Oslo, 2003.

[372] Zlatko Hodzic. Diffpack GUI: A portable and fully interactive application. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Xing Cai (main supervisor) and Are Magnus Bruaset, Department of Informatics, University of Oslo.

[373] Trond Gaarder. Interactive volume visualization. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Øyvind Andreassen (main supervisor), Norwegian Defence Research Establishment.

[374] Øyvind Sønes. Code generation for Ipaq Linux. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Ola Skavhaug (main supervisor), Department of Informatics, University of Oslo.

[375] Sveinug Myrild. Kodegenerering for Palm OS 5. english title: Code generation for Palm OS 5. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Ola Skavhaug (main supervisor), Department of Informatics, University of Oslo.

[376] Therese Hultmann. Code generation for Palm OS 4. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Ola Skavhaug (main supervisor), Department of Informatics, University of Oslo.

[377] Martin Jensen. QGEN: A Python to Qt/C++ translator. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Ola Skavhaug (main supervisor), Department of Informatics, University of Oslo.

[378] Magne Westlie. Utvikling av et Python grensesnitt til Diffpacks C++ biblioteker. english title: Development of a Python interface to Diffpack's C++ libraries. Cand. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Kent-Andre Mardal (main supervisor), Department of Informatics, University of Oslo.

[379] Simen Kvaal. The time dependent Schrödinger equation for a single charged particle. Cand. scient. thesis, Department of Physics, University of Oslo, 2004. Jointly supervised with Morten Hjorth-Jensen, Department of Physics, University of Oslo.

[380] Morten Lied Johansen. Building a better make – implementing PyMek. Cand. scient. thesis, Department of Informatics, University of Oslo, 2005.

[381] Knut-Erik Enerstvedt. Finite volume methods in Diffpack. Cand. scient. thesis, Department of Mathematics, University of Oslo, 2005.

[382] Ole Morten Thorsø Amundsen. Stochastic event simulation of oil recovery projects. Master of Science thesis, Department of Informatics, University of Oslo, 2005. Jointly supervised with Arne Bang Huseby (main supervisor), Division of Statistics, Department of Mathematics, University of Oslo.

[383] Lise Angell. High quality visualization with renderman. Master of Science thesis, Computational Science and Engineering Program, Department of Mathematics, University of Oslo, 2005. Jointly supervised with Xing Cai, Simula Research Laboratory and Department of Informatics, University of Oslo.

[384] Rolv E. Bredesen. Pvpython: Pythonizing two weather models. Master of Science thesis, Computational Science and Engineering Program, Department of Mathematics, University of Oslo, 2005. Jointly supervised with Greg Hakim (main supervisor), Department of Atmospheric Sciences, University of Washington, USA.

[385] Øyvind Nystad. High-level software for solving shallow water equations. Master of Science thesis, Computational Science and Engineering Program, Department of Mathematics, University of Oslo, 2005.

[386] Didrik Lilja. On testing the optimum principles of Murray's law. Master of Science thesis, Computational Science and Engineering Program, Department of Mathematics, University of Oslo, 2006. Jointly supervised with Kent-Andre Mardal (main supervisor), Simula Research Laboratory and Department of Informatics, University of Oslo.

[387] Joachim Berdal Haga. Numerical simulation of bose-einstein condensates. Master of Science thesis, Physics Program, Department of Physics, University of Oslo, 2006. Jointly supervised with Morten Hjorth-Jensen, Department of Physics, University of Oslo.

[388] Johannes Hofaker Ring. A Python library for solving partial differential equations. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2007.

[389] Henning Risvik. Visualizing multi-way sensory data. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2008. Jointly supervised with Tormod Næss and Oliver Tomic, Norwegian Food Research Institute (Nofima).

[390] Susanne Hentschel. Modeling and simulation of blood pressure in rats. Master of Science thesis, Applied Mathematics and Mechanics Program, Department of Mathematics, University of Oslo, 2008. Jointly supervised with Kent-Andre Mardal, Simula, and Torill Berg, Faculty of Medicine, University of Oslo.

[391] Kim Motoyoshi Kalland. A Navier-Stokes solver for single- and two-phase flow. Master of Science thesis, Applied Mathematics and Mechanics Program, Department of Mathematics, University of Oslo, 2008. Jointly supervised with Kristian Valen-Sendstad, Simula.

[392] Erik Fløisbonn. Integrating Conduit with Windows Installer. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2009. Jointly supervised with Arve Knudsen, Kalkulo AS.

[393] Ilmar Wilbers. A problem solving environment for partial differential equations in Python. Master of Science thesis, Applied Mathematics and Mechanics Program, Department of Mathematics, University of Oslo, 2009.

[394] Rustam Mehmandarov. DataPool: A tool for handling input data in simulation programs. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2009.

[395] Fredrik Fjeld. Extending DataPool: A tool for handling input data in scientific computing, using Python web frameworks. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2009.

[396] Magnus T. Sletholt. Agile scientists? investigating agile practices in scientific software development. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2011. Jointly supervised with Jo Hannay, Simula Research Laboratory, and Dietmar Pfhal, Lund University.

[397] Liwei Wang. A unified Python interface to a variety of software for solving ordinary differential equations. Master of Science thesis, Informatics Program, Department of Informatics, University of Oslo, 2012.

[398] Fredrik Eksaa Pettersen. Multi scale modelling of diffusion processes in dendrites and dendritic spines. Master of Science thesis, Physics Program, Department of Physics, University of Oslo, 2014.

[399] Torbjørn Hagen Seland. Mathematical analysis of epidemic systems – comparison of different models. Master of Science thesis, Applied Mathematics and Mechanics Program, Department of Mathematics, University of Oslo, 2015. Jointly supervised with Kent-Andre Mardal (main supervisor), Department of Mathematics, University of Oslo, and Simula.

Supervised Siv.Ing. Students (NTH/NTNU)

[400] Atle Myklebost. En ikke-lineær stokastisk modell for bevegelsen av en marin konstruksjon. English title: A Nonlinear Stochastic Model for the Movement of a Marine Structure. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 1992.

[401] Arne Skorstad. A stochastic model for a vibrating hysteretic system. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 1992.

[402] Morten Korsaksel. Regresjonsmetoder for deterministiske modeller. English title: Regression Methods for Deterministic Models. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 1996.

[403] Espen Ottar. Automation of visualization processes and the development of a scientific batch animation system. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 1996.

[404] Yngve Sandøy. Perturbation methods from the point of view of Maple. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 1996.

[405] Truls Flatberg. Optimization in Diffpack. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 1997.

[406] Kristian Valen-Sendstad. Development of difference-method-based Navier-Stokes solver. Siv. ing. thesis, Department of Mathematical Sciences, Norwegian University of Technology (NTH), 2006.

Supervised PhD Students

[407] Håvard Thevik. Mathematical modelling of macrosegregation formation close to a cast surface. Dr. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1996. Jointly supervised with Asbjørn Mo, SINTEF Material Technology, and Aslak Tveito, Department of Informatics, University of Oslo.

[408] Harald Osnes. Stochastic analysis of groundwater flow. Dr. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1996.

[409] Erik Holm. Finite elements and object-oriented implementation techniques for free boundary problems in fluid mechanics. Dr. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1998.

[410] Xing Cai. Numerical methods for partial differential equations and their object-oriented parallel implementation. Dr. scient. thesis, Department of Informatics, University of Oslo, 1999. Jointly supervised with Even Mehlum, SINTEF Applied Mathematics, and Aslak Tveito, Department of Informatics, University of Oslo.

[411] Otto Munthe. Finite element algorithms and object-oriented simulator design in viscous fluid dynamics. Dr. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 1999.

[412] Ivar Farup. Thermally induced deformations and hot tearing during direct chill casting of aluminium. Dr. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 2000. Jointly supervised with Asbjørn Mo, SINTEF Material Technology.

[413] Sami LaZghab. New modeling techniques for the shear boundary layer in the bearing channel during aluminium extrusion. Dr. scient. thesis, Mechanics Division, Department of Mathematics, University of Oslo, 2000. Jointly supervised with Trond Aukrust, SINTEF Material Technology, and Kjell Holthe, Dept. of Applied Mechanics, Fluid and Thermo-Dynamics, Norwegian University of Science and Technology (NTNU).

[414] Arlid Kjeldstad. Compaction and shear deformation in sedimentary basins - numerical modelling of differential loading in the vøring basin offshore mid-norway, and of heat transfer from magmatic intrusives, and experimental investigation of cataclastic shear band formation in reservoir sands. Dr. scient. thesis, Department of Geology, University of Oslo, 2002. Jointly supervised with Knut Bjørlykke and Kaare Høeg, Dept. of Geology, University of Oslo.

[415] Kent-Andre Mardal. Software and numerical methods for the incompressible Navier-Stokes equations. Dr. scient. thesis, Department of Informatics, University of Oslo, 2003. Jointly supervised with Ragnar Winther and Aslak Tveito, Dept. of Informatics, University of Oslo.

[416] Ola Skavhaug. Software and numerical methods with applications to computational finance. Dr. scient. thesis, Department of Informatics, University of Oslo, 2004. Jointly supervised with Aslak Tveito and Bjørn Fredrik Nielsen, Dept. of Informatics, University of Oslo.

[417] Frode Halvorsen. Mathematical modeling of shape variations on extruded aluminium sections. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2005. Jointly supervised with Trond Aukrust, SINTEF Materials and Chemestry, Oslo (main supervisor).

[418] Åsmund Ødegård. Applications of high level software for parallel solution of partial differential equations. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2006. Jointly supervised with Aslak Tveito, Simula Res. Lab.

[419] Gunnar Andreas Staff. Numerical computation of initial value problems originated from partial differential equations. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2006. Jointly supervised with Kent-Andre Mardal, Simula Research Laboratory (main supervisor).

[420] Sylfest Glimsdal. Numerical simulation of tsunamis. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2006. Jointly supervised with Geir Pedersen, Dept. of Mathematics, Univ. of Oslo, and Henning Dypvik, Dept. of Geoscience, Univ. of Oslo.

[421] Kristian Holmås. Modelling of two-phase flow using computational fluid dynamics. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2008. Jointly supervised with Jan Nossen, Institute for Energy Technology (Kjeller, Norway), and Ruben Schulkes, StatoilHydro.

[422] Håvard Holmås. Numerical simulation of waves in two-phase pipe flow using 1D two-fluid models. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2008. Jointly supervised with Ruben Schulkes, StatoilHydro, and Magnus Norsdveen, Scandpower Technology.

[423] Terje R. Tofteberg. Injection molding of microfeatured polymer components. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2010. Jointly supervised with Erik Andreassen, SINTEF (main supervisor).

[424] Omar Al-Khayat. Mesoscale modeling of particle flow. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2010. Jointly supervised with Are Magnus Bruaset, Simula.

[425] Amin Farjad Bastani. Modelling of the flow and temperature evolution in aluminium extrusion. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2011. Jointly supervised with Trond Aukrust, SINTEF (main supervisor).

[426] Kristian Valen-Sendstad. Computational cerebral hemodynamics. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2011. Jointly supervised with Kent-Andre Mardal, Simula (main supervisor), Bjørn Anders Pettersson Reif, FFI, and Mikael Mortensen, FFI.

[427] Carl Joachim Berdal Haga. Numerical methods for basin-scale poroelastic modelling. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2011. Jointly supervised with Harald Osnes, Department of Mathematics, University of Oslo.

[428] Saeed Bikass. Shape variation of extruded profiles due to rapid cooling. PhD thesis, Faculty of Mathematics and Natural Sciences, University of Oslo, 2013. Jointly supervised with Bjørn Andersson, SINTEF (main supervisor).