

Eirik Valseth

CONTACT INFORMATION

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RESEARCH INTERESTS

Applied and computational mechanics and mathematics, finite element methods, multiscale modeling, error estimation, compound flood and storm surge modeling.

EDUCATION

South Dakota School of Mines and Technology, Rapid City, South Dakota USA

Ph.D., Mechanical Engineering, December 2019

- Dissertation Title: Automatic Variationally Stable Analysis for Finite Element Computations.
- Advisor: Albert Romkes

South Dakota School of Mines and Technology, Rapid City, South Dakota USA

M.S., Mechanical Engineering, May 2015

Østfold University College, Fredrikstad, Norway

B.Sc., Mechanical Engineering, June, 2013

HONORS AND AWARDS

- Outstanding student organization member - SDSM&T Graduate Student Society April 2018.
- Travel award to represent SDSM&T at the Catalyzing and Advocacy in Science and Engineering (CASE) workshop in Washington, DC. March 2018.
- Travel award to attend Scientific Software Days at the University of Texas at Austin, April 2018.
- Fellowship award to attend Texas Advanced Computing Center summer institute - "Applied Parallel Programming" July 2020
- Conference award to attend the US National Congress on Computational Mechanics 16, July 25 - 29, 2021

SOCIETIES

Member of Pi Tau Sigma - mechanical engineering honor society.

Member of The United States Association for Computational Mechanics (USACM)

Member of The Society for Industrial and Applied Mathematics (SIAM)

Member of The Nordic Association of Computational Mechanics (NoACM)

Member of the Norwegian Mathematical Society

Member of the American Mathematical Society

Member of the American Geophysical Union

EXPERIENCE

The University of Texas at Austin, Austin, Texas USA

Research Associate, **July, 2021 - present**

Postdoctoral Fellow, **April, 2020 - June, 2021**

Mathematical modeling of storm surge, rainfall runoff, compound flooding, and software engineering for model coupling in the group of professor Clint Dawson - Computational Hydraulics Group.

South Dakota School of Mines and Technology, Rapid City, South Dakota USA

Postdoctoral Researcher, **December, 2019 - March 2020**

Development and implementation of inverse finite element methods.

Graduate Research Assistant, **August, 2018 - December, 2019**

Development and implementation of finite element simulations for mineral beneficiation systems. NSF Grant 1805550 - Sustainable System for Mineral Beneficiation. PI Jon Kellar, Co-PIs William Cross and Albert Romkes.

Graduate Teaching Assistant, **August, 2015 - May, 2018**

- ME 316 Solid Mechanics.
- ME 528 Applied Finite Element Analysis.
- ME 216 Intro to Solid Mechanics.
- ME 322 Machine Design.
- ME 221 Dynamics of Mechanisms.

Graduate Research Assistant, **October, 2015 - May, 2016**

Development and implementation of finite element simulations of electromagnetic fields.

Institute For Energy Technology, Halden, Norway

Reactor Operator, **June, 2011 - January, 2016**

Control room operation of the OECD Halden Reactor Project's Heavy Boiling Water Reactor.

Østfold University College, Fredrikstad, Norway

Teaching Assistant, **August, 2011 - December, 2012**

- Introductory Real Analysis.
- Classical Physics.
- Introductory Material Science, Ferrous Materials.
- Fluid Mechanics, Aerodynamics.

Norwegian Armed Forces, Kirkenes, Norway

Border Patrol Ranger, Rank: *Corporal*, **July, 2007 - July, 2008**

Required Conscriptio service in the Norwegian Army for one year at the Garrison of South Varanger.

CONFERENCES
ORGANIZED OR
CHAIRIED

Co-Organizer of minisymposium: Computational Methods in Environmental Fluid Flows – World Congress on Computational Mechanics 2022 - **WCCM-APCOM 2022**, Yokohama, Japan, July 31 to August 5, 2022.

Co-Organizer of minisymposium: Computations in Environmental Fluid Flows, European Community on Computational Methods in Applied Sciences Congress 2022 - **ECCOMAS 2022**, Oslo, Norway, June 5 – 9, 2022.

Co-Organizer of minisymposium: Recent Advances in Numerical Methods for Shallow Water Flows, SIAM Texas-Louisiana annual meeting 2022 - **SIAM Tx-La 21**, South Padre Island, Texas, November 5 – 7, 2022.

Co-organizer of minisymposium: Computational Methods in Environmental Fluid Mechanics, US National Congress on Computational Mechanics 16 - **USNCCM 16**, July 25 - 29, 2021, Chicago, Illinois.

Co-Organizer of minisymposium: Stabilized and Unconditionally Stable FE Methods for Challenging

Problems in Engineering and Science, ECCOMAS Young Investigator's conference - **ECCOMAS YIC 2021**, July 7 - 9, 2021, Valencia, Spain.

Co-organizer of minisymposium : Computational Methods in Environmental Fluid Mechanics, SIAM Conference on Mathematical & Computational Issues in the Geosciences, **SIAM GS21** June 21 - 24, 2021, Milano, Italy.

Program Committee Member of workshop Artificial Intelligence and High-Performance Computing for Advanced Simulations (formerly Agent-Based Simulation, Adaptive Algorithms and Solvers) At the International Conference on Computational Science - **ICCS 2020** - d.d.

PUBLICATIONS

Valseth, E., Dawson, C., An Adaptive Stable Space-Time FE Method for the Shallow Water Equations. Accepted in Computational Geosciences (2021) arXiv preprint arXiv:2010.00057 [math.NA]

E. Valseth, M.D. Loveland, C. Dawson, E.J. Buskey, A Study of the Impact of Dredging the Corpus Christi Ship Channel on Passive Particle Transport. Journal of Marine Science and Engineering (2021) <https://doi.org/10.3390/jmse9090935>

Valseth, E., Romkes, A., Kaul, A.R., Dawson, C., A Stable Mixed FE Method for Nearly Incompressible Linear Elastostatics. International Journal for Numerical Methods in Engineering, <https://doi.org/10.1002/nme.6743> (2021).

Dawson, C., Loveland, M., Valseth, E., Potential Effects of Deepening of the Aransas Ship Channel on Particle Transport: Implications for Recruitment of Estuarine Dependent Larvae. The University of Texas at Austin Marine Science Institute Report (2021) link.

Valseth, E., Behnoudfar, P., Dawson, C., Romkes, A., Automatic Variationally Stable Analysis for Finite Element Computations: Transient Convection-Diffusion Problems. Submitted, arXiv preprint arXiv:2010.00057 [math.NA] (2021).

Valseth, E., Dawson, C., An Unconditionally Stable Space-Time FE Method for the Korteweg-de Vries Equation. Computer Methods in Applied Mechanics and Engineering 371 (2020), DOI: <https://doi.org/10.1016/j.cma.2020.113297>.

Valseth, E., Romkes, A., Kaul, A.R., A Stable FE Method For The Space-Time Solution of the Cahn-Hilliard Equation. Journal of Computational Physics, <https://doi.org/10.1016/j.jcp.2021.110426> (2021).

Valseth, E., Romkes, A., Goal-Oriented Error Estimation for the Automatic Variationally Stable FE Method for Convection-Dominated Diffusion Problems. Computers and Mathematics With Applications (2020) DOI: <https://doi.org/10.1016/j.camwa.2020.10.019>.

Calo, V.M., Romkes, A., and Valseth, E., Variationally Stable Analysis for Finite Element Computations: An Introduction. Lecture Notes in Computational Science and Engineering, Springer Verlag (2018) DOI: https://doi.org/10.1007/978-3-030-41800-7_2.

CONFERENCE PRESENTATIONS

E. Valseth, C. Dawson, E. Buskey, A Study of the Potential Impact of Deepening the Corpus Christi Ship Channel on Hurricane Storm Surge. OSM 2022, February 27- March 4, 2022 Honolulu, Hawaii.

E. Valseth, C. Dawson, Goal-Oriented Error Estimation for the Shallow Water Equations. 4th Annual Meeting of the SIAM Texas-Louisiana Section, November 5-7, 2021 South Padre Island, Texas.

E. Valseeth, M. Loveland, C. Dawson, E. Buskey, A Study of the Potential Impact of Dredging the Corpus Christi Ship Channel on Passive Particle Transport. YCSEC-A 2021, October 28 - 30, 2021, Myrtle Beach, North Carolina.

M. Loveland, E. Valseeth, C. Dawson, E. Buskey, Simulating Potential Impacts of Dredging on Local Fish Populations. TACC Symposium for Texas Researchers 2021, September 23-24, 2021, Austin, Texas.

E. Valseeth, Dawson, C., An Adaptive Space-Time FE Method for the Shallow Water Equations. USNCCM 16, July 25 - July 29, 2021, Chicago, Illinois (*virtual*).

E. Valseeth, Dawson, C., A Space-Time FE Method for the Shallow Water Equations. SIAM GS21, June 21 - June 24, 2021, Milan, Italy (*virtual*).

E. Valseeth, Dawson, C., A DPG Method for the Shallow Water Equations Using Continuous Trial Functions. SIAM CSE 2021, March 1-5, 2021, Fort Worth, Texas (*virtual*).

E. Valseeth, Dawson, C., An unconditionally stable space-time FE method for the Shallow Water Equations. 3rd Annual Meeting of the SIAM Texas-Louisiana Section, October 16-18, 2020, College Station, Texas.

E. Valseeth, Dawson, C., A space-time FE method for the Shallow Water Equations. TACC Symposium for Texas Researchers 2020, September 17-18, 2020, Austin, Texas.

E. Valseeth, Dawson, C.N., Romkes, A., Calo, V.M., Automatic Variationally Stable Analysis for FE Computations. WCCM ECCOMAS 2020, July 19-24, 2020, Paris, France. *Cancelled due to COVID-19*

Behnoudfar, P., E. Valseeth, Calo, V.M., Romkes, A., Stabilized FE Methods for Time-Dependent Problems. WCCM ECCOMAS YIC Special Track 2020, July 19-24, 2020, Paris, France. *Cancelled due to COVID-19*

E. Valseeth, Romkes, A., Calo, V.M., Automatic Variationally Stable Analysis for FE Computations. ECCOMAS YIC 2019, September 1 - 6, 2019, Krakow, Poland.

E. Valseeth, Romkes, A., Calo, V.M., Automatic Variationally Stable Analysis for FE Computations of Convection-Dominated Diffusion Problems. USNCCM 2019, July 28 - August 1, 2019, Austin, Texas.

Romkes, A., E. Valseeth, Calo, V.M., Automatic Variationally Stable FE and Goal-Oriented A Posteriori Error Analyses of Convection-Dominated Boundary Value Problems. FEF 2019, March 31 - April 3, 2019, Chicago, Illinois.

Romkes, A., Calo, V.M., Paszynski, M., Los, M., E. Valseeth, Automatic Variationally Stable Analysis for FE Computations Based on the DPG Framework. USACM IGA 2018: Integrating Design and Analysis, October 10-12, 2018, Austin, Texas, USA.

Calo, V. M., Collier, N., Kirby, R., Los, M., Niemi, A., Paszynski, M., Romkes, A., E. Valseeth, "Automatic Variationally Stable Discretizations", II International Conference Multiscale Methods and Large-Scale Scientific Computing, August 15-17, 2018, Moscow, Russia.

E. Valseeth, Romkes, A., Calo, V.M., and Kirby, R.C., A First Order System Discontinuous Petrov-Galerkin Method Using Continuous Trial Spaces. WCCM 2018, July 22-27, 2018, New York City, USA.

Calo, V. M., Collier, N., Demkowicz, L., Gopalakrishnan, J., Los, M., Niemi, A., Paszynski, M., Romkes, A., E. Valseth, “Stabilization of convection-dominated diffusion with optimal test functions”, International Conference on Boundary and Interior Layers (BAIL 2018) , June 18-22, 2018, Glasgow, Scotland.

Romkes A., E. Valseth, and Calo, V.M., A Hybrid Continuous-Discontinuous Petrov-Galerkin Method for Second Order PDEs. 5th Int’l Congress on Multiphysics, Multiscale, and Optimization Problems, May 24-25, 2018, BCAM, Bilbao, Bizkaia, Spain

Romkes A., Moody, T.C., and E. Valseth, Multi-Scale Modeling of Heterogeneous Elastic Solids based on the Control of Modeling Error through Local Error Estimation. 4th Int’l Congress on Multiphysics, Multiscale, and Optimization Problems, May 27, 2016, BCAM, Bilbao, Bizkaia, Spain

INVITED SEMINARS An Automatically Stable FE Method With an Application to Shallow Water Modeling. The Babuška seminar at the Oden Institute for Computational Engineering and Sciences, January 29 2021, Austin, Texas.

Automatic Variationally Stable Analysis for FE Computations. Department of Mechanical Engineering, South Dakota School of Mines & Technology, November 17, 2019, Rapid City, South Dakota.

Automatic Variationally Stable Analysis for FE Computations. Department of Computer Science Seminar, AGH University, September 4, 2019, Krakow, Poland.

Automatic Variationally Stable Analysis for FE Computations. PDE Seminar, Faculty of Mathematics and Natural Sciences, university of Oslo, Jan 7 2019, Oslo, Norway.

SERVICE

South Dakota School of Mines and Technology, Rapid City, South Dakota USA

Faculty search committee, **September, 2018 - May, 2019**

Graduate student representative in the search for the “Stensaas Endowed Chair” in the Mechanical Engineering department.

Østfold University College, Fredrikstad, Norway

University Research and Development Council, **August, 2011 - June, 2012**

Student representative on the university research and development council.

Journal Reviewer

Computer Methods in Applied Mechanics and Engineering

Computer Science

Computational Geosciences

Poster Judge

SIAM CSE21 student poster competition

PROGRAMMING AND SOFTWARE SKILLS

- Parallel programming: OpenMP and MPI.
- Languages: C++, C, FORTRAN, Python and MATLAB.
- FEM software: Firedrake, FEniCS, ANSYS, and Abaqus.
- Text editors: L^AT_EX, MS Office
- Operating Systems: Unix/Linux, Windows, and MACOS