



Conference on
Mathematical & Computational
Issues in the Geosciences

June 19–22, 2023
Radisson Blu Royal Hotel, Bergen Norway

Online Program

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Attendees are encouraged to visit

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Monday, June 19**7:30 a.m. – 12:45 p.m.**Registration
*Foyer***7:55 a.m. – 8:10 a.m.**Conference opening by Margareth Hagen, Rector of the University of Bergen, and welcome remarks by Linn Kristin Engø, Mayor of Bergen
*Plenary Hall***8:10 a.m. – 8:55 a.m.****IP1** Image Based Modelling of Plant-Soil Interaction
Tiina Roose, University of Southampton, United Kingdom
*Plenary Hall***8:55 a.m. – 9:10 a.m.**Coffee Break
*Foyer***9:10 a.m. – 10:50 a.m.****Concurrent Sessions****MS1** Testing Predictive Capabilities of Geologic CO₂ Storage with Meter-Scale Laboratory Experiments - Part I of II
*Plenary Hall***MS2** Numerical Analysis of Finite Element Schemes for PDEs with Point or Line Sources
*Dræggen 3***MS3** Domain Decomposition and Time-Splitting Methods for Multiscale Multiphysics Problems - Part I of II
*Dræggen 4***MS4** Inverse Problems in Imaging and Tomographic Issues, Theory and Practice - Part I of II
*Dræggen 7***MS5** Computational Aspects of Ensemble Design and Interpretation in Climate Science and Modelling - Part I of II
*Dræggen 8***MS6** Pore-Scale Modeling
*Bugården***10:50 a.m. – 11:00 a.m.**

Intermission

11:00 a.m. – 12:40 p.m.**Concurrent Sessions****MS7** Multiscale Modeling of Porous Media Applications
*Plenary Hall***MS8** Recent Advances in Numerical Methods for Poromechanics - Part I of II
*Dræggen 3***MS9** Advanced Methods for Data-Driven Modeling in Porous Media Applications - Part I of II
*Dræggen 4***Monday, June 19****MS10** Inverse Problems in Imaging and Tomographic Issues, Theory and Practice - Part II of II*Dræggen 7***MS11** Embedded and Immersed Methods in the Geosciences: Full-Order and Reduced-Order Models
*Dræggen 8***MS12** Advances in Biogeochemical Reactive Flow in Subsurface Resources
*Bugården***12:40 p.m. – 1:40 p.m.**Lunch served.
(Available to all registrants. Included in registration fee.)
*Foyer***1:40 p.m. – 2:25 p.m.****IP2** Differentiable Simulators: Implications for Software Development and Applications to Reduced-order and Data-driven Modelling
Knut-Andreas Lie, SINTEF, Norway
*Plenary Hall***2:25 p.m. – 2:40 p.m.**Coffee Break
*Foyer***2:40 p.m. – 4:20 p.m.****Concurrent Sessions****MS13** Developing Complex Simulation Software - Part I of II
*Plenary Hall***MS14** Solution Strategies for Flow and Deformation in Fractured Porous Media
*Dræggen 3***MS15** Mathematical Analysis and Numerical Modelling of Atmosphere-Ocean-Sea-Ice equations
*Dræggen 4***MS16** Data Science Applications to Inverse and Optimization Problems in Geosciences - Part I of II
*Dræggen 7***MS17** Uncertainty Quantification for Tsunamis and Their Sources - Part I of II
*Dræggen 8***MS18** Mathematical Modelling, Analysis and Simulation of Processes Involving Moving Interfaces - Part I of II
*Bugården***4:20 p.m. – 4:30 p.m.**

Intermission

4:30 p.m. – 6:10 p.m.**Concurrent Sessions****MS19** Computational Aspects of Ensemble Design and Interpretation in Climate Science and Modelling - Part II of II
*Plenary Hall***Monday, June 19****MS20** Coupled Multi-Physics Problems in Geosciences: Numerical Methods - Part I of II
*Dræggen 3***MS21** Advances in Bayesian Inversion for Geoscience Problems - Part I of II
*Dræggen 7***MS22** Multiphysics Modeling and Simulation of Flow and Geomechanics - Part I of II
*Bugården***CP1** Simulations, Preconditioning and Computational Tools
*Dræggen 4***CP2** Order Reduction and Model Reduction
*Dræggen 8***6:10 p.m. – 6:20 p.m.**

Intermission

6:20 p.m. – 7:20 p.m.SIAG/GS Business Meeting
*Plenary Hall***Tuesday, June 20****7:45 a.m. – 12:00 p.m.**Registration
*Foyer***8:00 a.m. – 8:10 a.m.**SIAG/GS Career and SIAG/GS Early Career Prize Presentations
*Plenary Hall***8:10 a.m. – 8:55 a.m.****SP1** SIAM Activity Group on Geosciences Career Prize Lecture
Christine Shoemaker, National University of Singapore, Singapore
*Plenary Hall***8:55 a.m. – 9:15 a.m.****PP1** Coffee Break and Poster Session
Posters will be on display during Tuesday coffee breaks
*Foyer***9:15 a.m. – 10:55 a.m.****Concurrent Sessions****MS23** Iterative Methods for Porous Media Applications: Linearization and Domain Decomposition Schemes - Part I of II
*Plenary Hall***MS24** Solution Strategies for Flow and Deformation in Fractured Porous Media - Part II
Dræggen 3

Tuesday, June 20**Tuesday, June 20****Wednesday, June 21**

MS25 Coupled Multi-Physics Problems in Geosciences: Model Derivation and Analysis - Part I of II

Dræggen 4

MS26 Advanced Methods for Data-Driven Modeling in Porous Media Applications - Part II of II

Dræggen 7

MS27 Probabilistic Approaches to Inverse Problems in Geophysical Sciences

Dræggen 8

MS28 Advances in Modeling and Simulation of Multiphase and Multicomponent Flow in Porous Media

Bugården

10:55 a.m. – 11:40 a.m.

IP3 Element-based Galerkin Methods in Atmospheric Modeling

Francis X. Giraldo, Naval Postgraduate School, U.S.
Plenary Hall

11:40 a.m. – 12:40 p.m.

Lunch served.

(Available to all registrants. Included in registration fee.)
Foyer

12:40 p.m. – 2:20 p.m.

Concurrent Sessions

MS29 Testing Predictive Capabilities of Geologic CO₂ Storage with Meter-Scale Laboratory Experiments - Part II of II

Plenary Hall

MS30 Recent Advances in Numerical Methods for Poromechanics - Part II of II

Dræggen 3

MS31 Domain Decomposition and Time-Splitting Methods for Multiscale Multiphysics Problems - Part II of II

Dræggen 4

MS32 Data Science Applications to Inverse and Optimization Problems in Geosciences - Part II of II

Dræggen 7

MS33 Advances in Bayesian Inversion for Geoscience Problems - Part II of II

Dræggen 8

MS34 Modeling Arctic and Cold Region Processes - Part I of II

Bugården

2:20 p.m. – 2:40 p.m.

Coffee Break and Poster Session

****Posters will be on display during Tuesday coffee breaks****

Foyer

2:40 p.m. – 4:40 p.m.

Concurrent Sessions

MT1 Micro-Continuum Modelling: An Hybrid-Scale Approach for Solving Coupled Processes in Porous Media

Plenary Hall

MT2 Compositional Simulation for Modeling of Complex Subsurface Applications

Dræggen 3

MT3 Mesh Refinement/Coarsening Strategies and Advanced Numerical Methods Based on General-Shaped Meshes to Tackle Simulations in Large Scale Discrete Fracture Networks

Dræggen 4

4:40 p.m. – 4:50 p.m.

Intermission

4:50 p.m. – 6:30 p.m.

Concurrent Sessions

CP3 Parallel Computing and Solution Strategy

Plenary Hall

CP4 Numerical Analysis

Dræggen 3

CP5 Stochastic Processes and Uncertainty

Dræggen 4

CP6 Multiscale and Fractal Geometry

Dræggen 7

CP7 Data-Driven and Data Assimilation

Dræggen 8

CP8 Mathematical Modelling and Analytical Methods

Bugården

4:50 p.m. – 8:50 p.m.

Bus excursion to the Northern Lights CCS site
(confirmed participants only).

Wednesday, June 21

7:45 a.m. – 12:00 p.m.

Registration

Foyer

8:00 a.m. – 8:50 a.m.

IP4 Remarks and Presentation: A Posteriori Error Estimates Robust with Respect to Nonlinearities and Final Time

Martin Vohralik, Inria Paris, France

Plenary Hall

8:50 a.m. – 9:10 a.m.

Coffee Break

Foyer

9:10 a.m. – 10:50 a.m.

Concurrent Sessions

MS35 Developing Complex Simulation Software - Part II of II

Plenary Hall

MS36 Recent Advances in Polytopal Methods for Applications in Geosciences - Part I of II

Dræggen 3

MS37 Coupled Multi-Physics Problems in Geosciences: Model Derivation and Analysis - Part II of II

Dræggen 4

MS38 New Frontiers in Data Assimilation Using Complex Physical Models - Part I of II

Dræggen 7

MS39 Uncertainty Quantification for Tsunamis and Their Sources - Part II of II

Dræggen 8

MS40 Modeling Arctic and Cold Region Processes - Part II of II

Bugården

10:50 a.m. – 11:00 a.m.

Intermission

11:00 a.m. – 11:45 a.m.

SP2 SIAM Activity Group on Geosciences Early Career Prize Lecture: Scalable Passive Seismology Eileen R. Martin, Colorado School of Mines and Virginia Tech, U.S.

Plenary Hall

11:45 a.m. – 12:45 p.m.

Lunch served.

(Available to all registrants. Included in registration fee.)
Foyer

12:45 p.m. – 2:25 p.m.

Concurrent Sessions

MS41 Mathematical Modelling, Analysis and Simulation of Processes Involving Moving Interfaces - Part II of II

Plenary Hall

MS42 Advanced Numerical Techniques for Generalized Biot Models

Dræggen 3

MS43 Theoretical and Numerical Advances for Mixed-Dimensional 3d-1d Coupling - Part I of II

Dræggen 4

MS44 Innovative Simulation Techniques for Numerical Climate Models - Part I of II

Dræggen 7

MS45 Theoretical Aspects of Ensemble Design and Interpretation in Climate Science and Modelling - Part I of II

Dræggen 8

MS46 Multiphysics Modeling and Simulation of Flow and Geomechanics - Part II of II

Bugården

Wednesday, June 21

2:25 p.m. – 2:45 p.m.

Coffee Break

Foyer

2:45 p.m. – 4:25 p.m.

Concurrent Sessions

MS47 Numerical Solvers for Flow and Transport Problems in Geosciences on Parallel and Hybrid Computing Architectures - Part I of II

Plenary Hall

MS48 Iterative Methods for Porous Media

Applications: Linearization and Domain

Decomposition Schemes - Part II of II

Dræggen 3

MS49 Modeling, Simulations, and Analysis for Flow and Transport in Porous Media - Part I of II

Dræggen 4

MS50 Fusing Machine Learning and Climate/

Weather Modelling

Dræggen 7

MS51 Statistical Methods for Monitoring of the Earth System Using Observational Data - Part I of II

Dræggen 8

MS52 Multiphysics Modeling and Simulations for

Coupled Problems in Porous Media - Part I of II

Bugården

4:25 p.m. – 4:45 p.m.

Intermission

4:45 p.m. – 5:45 p.m.

PD1 Early Scientists' Career Panel

Plenary Hall

7:00 p.m. – 11:00 p.m.

Conference Dinner

(ticketed event; separate fee applies)

Bergen Aquarium

Thursday, June 22

7:45 a.m. – 8:30 a.m.

Registration

Foyer

8:00 a.m. – 8:45 a.m.

IP5 Numerical Methods for Modeling, Editing, and Analyzing Subsurface Structure

Bradley Mallison, Chevron Technical Center, U.S.

Plenary Hall

8:45 a.m. – 9:05 a.m.

PP2 Coffee Break and Poster Session

Posters will be on display during Thursday coffee breaks

Foyer

Thursday, June 22

9:05 a.m. – 10:45 a.m.

Concurrent Sessions

MS53 A Deep Dive into Shallow Water - Part I of II

Plenary Hall

MS54 Numerical Solvers for Flow and Transport Problems in Geosciences on Parallel and Hybrid Computing Architectures - Part II of II

Dræggen 3

MS55 Theoretical and Numerical Advances for Mixed-Dimensional 3d-1d Coupling - Part II of II

Dræggen 4

MS56 New Frontiers in Data Assimilation Using Complex Physical Models - Part II of II

Dræggen 7

MS57 Statistical Methods for Monitoring of the Earth System Using Observational Data - Part II of II

Dræggen 8

MS58 Multiphysics Modeling and Simulations for Coupled Problems in Porous Media - Part II of II

Bugården

10:45 a.m. – 10:55 a.m.

Intermission

10:55 a.m. – 12:35 p.m.

Concurrent Sessions

MS59 A Deep Dive into Shallow Water - Part II of II

Plenary Hall

MS60 Recent Advances in Polytopal Methods for Applications in Geosciences - Part II of II

Dræggen 3

MS61 Modeling, Analysis and Numerical Methods for Coupled Fluid-Porous Systems - Part I of II

Dræggen 4

MS62 Innovative Simulation Techniques for Numerical Climate Models - Part II of II

Dræggen 7

MS63 Modeling, Simulations, and Analysis for Flow and Transport in Porous Media - Part II of II

Dræggen 8

MS64 Modeling and Simulation of Fluids and

Transport at Multiple Scales

Bugården

12:35 p.m. – 1:35 p.m.

Lunch served.

(Available to all registrants. Included in registration fee.)

Foyer

1:35 p.m. – 2:25 p.m.

IP6 Presentation and Closing Remarks: Data Assimilation for Hydrological Predictions in the Subsurface

Insa Neuweiler, University of Hannover, Germany

Plenary Hall

2:25 p.m. – 2:35 p.m.

Intermission

Thursday, June 22

2:35 p.m. – 4:15 p.m.

Concurrent Sessions

MS65 Practical Simulation of Geothermal Energy Systems

Plenary Hall

MS66 Coupled Multi-Physics Problems in Geosciences: Numerical Methods - Part II of II

Dræggen 3

MS67 Modeling, Analysis and Numerical Methods for Coupled Fluid-Porous Systems - Part II of II

Dræggen 4

MS68 Resolving Complex Processes in Multiphase Flow

Dræggen 7

MS69 Theoretical Aspects of Ensemble Design and Interpretation in Climate Science and Modelling - Part II of II

Dræggen 8

MS70 Modelling and Simulation of Density-Driven Groundwater Flow

Bugården

4:15 p.m. – 4:35 p.m.

Coffee Break

Foyer

4:35 p.m. – 6:15 p.m.

Concurrent Sessions

CP9 Neural Networks and Machine Learning

Plenary Hall

CP10 Numerical Methods

Dræggen 3

CP11 Upscaling Methods

Dræggen 4

CP12 Dynamical and Inverse Problems

Dræggen 7

CP13 Diffuse Interface Methods

Dræggen 8

CP14 Simulations in Geodynamics

Bugården

Friday, June 23

8:30 a.m. – 12:30 p.m.

Bus excursion to the Northern Lights CCS site (confirmed participants only).

Key to abbreviations

CP = Contributed Presentation Session

IP = Invited Plenary Speaker

MS = Minisymposium

MT = Minitutorial

PD = Panel Discussion

PP = Poster Session

SP = Special Lecture

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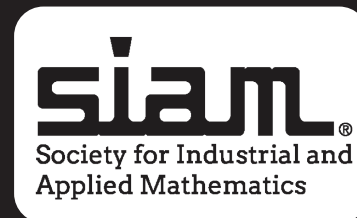
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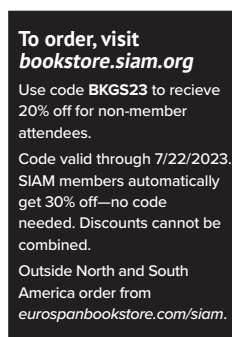
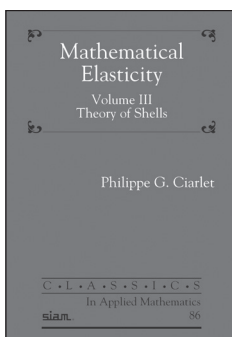
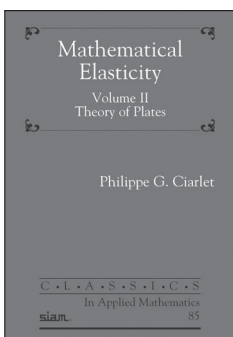
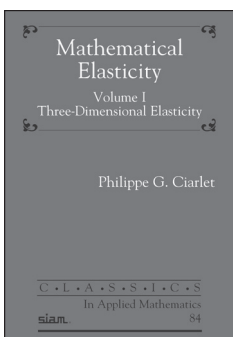
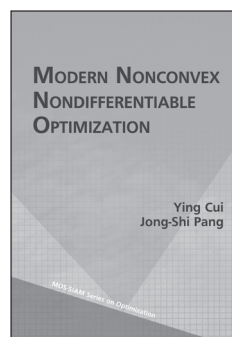
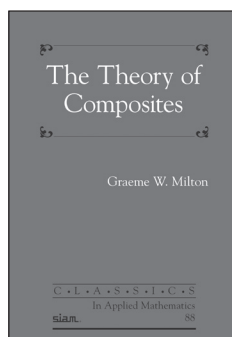
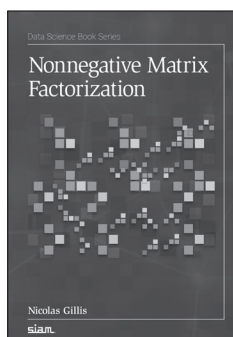
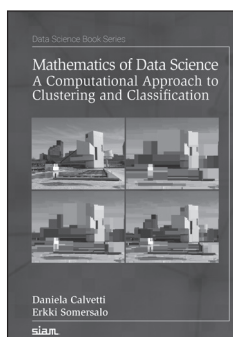
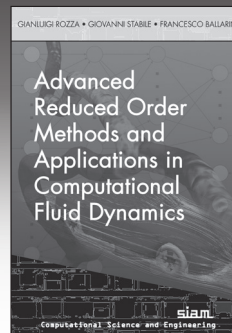
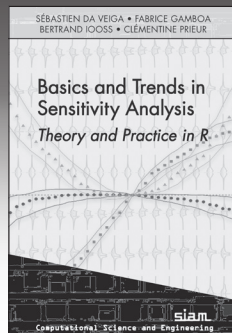
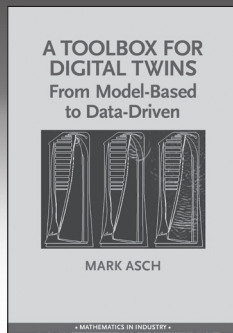
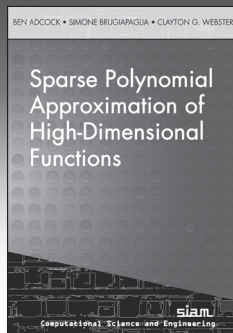
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