

# SNA'25 Programme

<https://sna.vsb.cz>

## SEMINAR ON NUMERICAL ANALYSIS

*Modelling and Simulation of Challenging Engineering Problems*

## WINTER SCHOOL

*Methods of Numerical Mathematics and Modelling,  
High-Performance Computing, Numerical Linear Algebra*

**Monday - January 27, 2025** venue: **FEI VŠB-TUO / EC1**

11:00 – 13:50 Registration – FEI VŠB-TUO

12:00 – 13:50 *Lunch - Menza VŠB-TUO*

14:00 – 14:30 **Conference opening**

14:30 – 16:00 Winter school - *chair M. Tůma*

**M. Ferronato:** Coupled simulation of flow and deformation in fractured porous media: discretizations, solvers and applications I

*Coffee break*

16:30 – 18:30 Lectures in hybrid form - *chair T. Vejchodský*

**Y. Saad:** The numerical linear algebra of deep neural networks (*on-line*)

**A. Khan:** Estimating mean and variance of random coefficients in stochastic variational problems (*on-line*)

**J. Kraus:** Fixed-stress method for a class of nonlinear poroelasticity problems

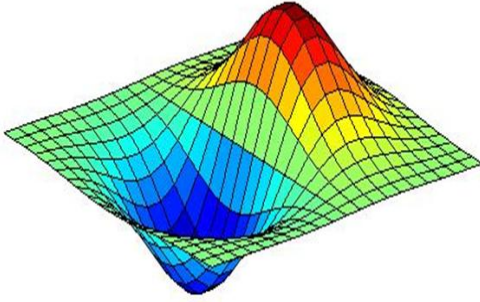
**J. Šístek:** Speeding up an unsteady flow simulation by the adaptive BDDC and Krylov subspace recycling

19:00 – 22:00 *Welcome dinner – Menza VŠB-TUO*

Conference venues:

**FEI VŠB-TUO** Faculty of Electrical Engineering and Computer Science, Technical University of Ostrava

**ÚGN AVČR** Institute of Geonics, Czech Academy of Sciences, Ostrava



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**Tuesday - January 28, 2025** venue: **FEI VŠB-TUO / EC1**

9:00 – 10:30 Winter school - *chair J. Kraus*

**M. Ferronato:** Coupled simulation of flow and deformation in fractured porous media: discretizations, solvers and applications II

*Coffee break*

11:00 – 12:40 Lectures - *chair M. Ferronato*

**M. Lanzendörfer:** Non-newtonian fluids in characterizing porous media

**J. Stebel:** Poroelastic model of fractured rock with anisotropy

**J. Machalová:** Identification of Material parameters in the nonlinear Gao beam model

**T. Ligurský:** A thermodynamically consistent full hydro-mechanical coupling

12:40 – 14:00 *Lunch - Menza VŠB-TUO*

14:00 – 16:00 Lectures - *chair M. Plešinger*

**I. Hnětynková:** Unified approach to data extraction from multilinear approximation problems

**M. Rozložník:** On the symplectic  $LL^T$  factorization

**J. Papež:** Error estimate for least-squares problems solved by LSQR and CGLS

**T. Hammerbauer:** Hybrid Schwarz preconditioners for linear systems arising from discontinuous Galerkin method

**D. Horák:** Improving performance of augmented Lagrangians

*Coffee break*

16:30 – 18:30 Lectures - *chair M. Brandner*

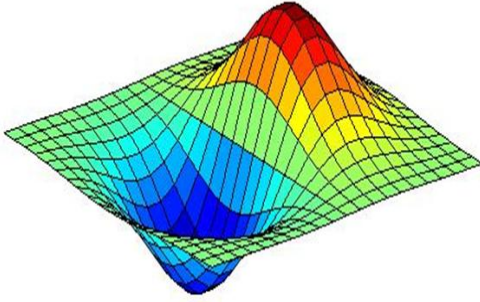
**J. Kruis:** Lattice Discrete Particle Model for 3D-Printed Alloy Structures

**R. Cimrman:** Towards efficient numerical solution of flexoelectric problems

**M. Isoz:** What is a reasonable level of agreement between POD analyses of simulated and measured flow fields?

**O. Studeník:** Towards high-fidelity non-spherical CFD-DEM: Advancing DEM contact models

**V. Steinbach:** Numerical modeling of coupled water, vapour and heat transport in beech forest soil



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**Wednesday - January 29, 2025** venue: **FEI VŠB-TUO / EC1**

9:00 – 10:30 Winter school - *chair I. Hnětynková*

**M. Tůma:** Solving large sparse linear systems and least squares I

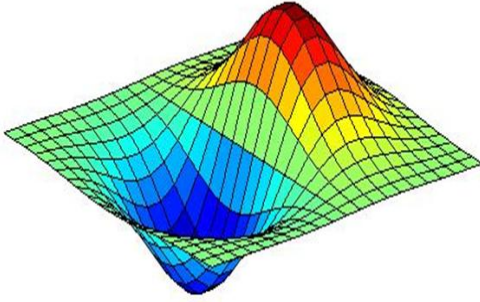
*Coffee break*

11:00 – 12:30 Winter School - *chair M. Rozložník*

**J. Vybíral:** Mathematics of neural networks I

*12:30 – 13:40 Lunch - Menza VŠB-TUO*

13:45 – 18:00 *Excursion*



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**Thursday - January 30, 2025** venue: **FEI VŠB-TUO / EC1**

9:00 – 10:30 Winter school - *chair J. Papež*

**M. Tůma:** Solving large sparse linear systems and least squares II

*Coffee break*

11:00 – 12:30 Winter school - *chair J. Šístek*

**J. Vybíral:** Mathematics of neural networks II

*12:30 – 14:00 Lunch - Menza VŠB-TUO*

14:00 – 15:30 The Blaheta lecture - *chair D. Horák*

**U. Růde:** Solvers for extreme scale computing

*Coffee break*

16:00 – 17:40 Lectures - *chair J. Kruis*

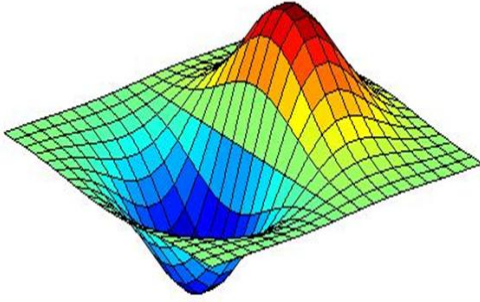
**I. Pultarová:** Preconditioning of PDEs with guaranteed spectral bounds

**J. Haškovec:** Discrete and continuum models of robust biological transportation networks

**J. Malík:** Mathematical model for energy storage and release in the form of compressed air

**Z. Machaczek:** PU based operator preconditioning in boundary element method

17:40 – 18:00 Presentations to posters



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**Thursday - January 30, 2025** venue: **ÚGN AVČR**

18:30 – 19:30 **Poster session**

**M. Béreš:** Bayesian inversion with neural network surrogates for TSX parameters estimation

**M. Brandner:** Shape optimization of water turbines

**M. Čosićová:** Tests of neural network diabatization method on 1D models of avoided crossing

**L. Kaperá:** Signorini problem

**A. Kovárnová:** Accelerating parameter identification in bread baking simulations via model order reduction

**D. Krpelík:** Differential forms and Whitney elements in numerical electromagnetics

**T. Luber:** Biot's poroelasticity in numerical experiments

**C. Matonoha:** Optimization system UFO - version 2024

**T. Ondro:** Calculating the non-linear baryonic density using the Zeldovich approximation

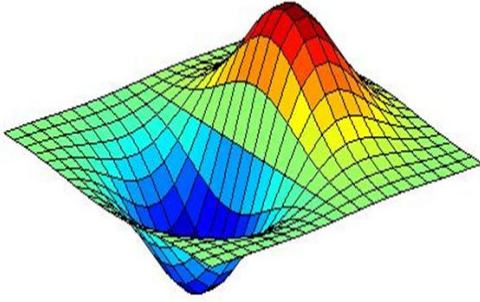
**L. Pospíšil:** 2D Elastoplastic Contact Problems in MATLAB: Mortar Methods and Quadratic Optimization

**A. Růžička:** Convergence improvement of 2D linear elasticity solvers using preconditioning and deflation

**T. Světlík:** Improved handling of nonlinear constraints in 2D steel frame optimization

**R. Varga:** Parameter fitting of DEM-BBM models using the Newmark method

19:30 – 23:00 *Conference dinner – ÚGN AVČR*



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**Friday - January 31, 2025** venue: **FEI VŠB-TUO / EC1**

09:00 – 10:30 Winter School - *chair I. Pultarová*

**P. Vodstrčil:** Selected inequalities in the analysis of domain decomposition methods

*Coffee break*

10:50 – 12:00 Lectures – *chair D. Lukáš*

**V. Arzt:** Solving Stokes problem with stick-slip boundary conditions by semi-smooth\*  
Newton method

**S. Sysala:** Advanced continuation and iterative methods for slope stability analysis in 3D

**Conference closing**

*12:00 – 14:00 Lunch - Menza VŠB-TUO*