

# HPCSE 2022

High Performance Computing in  
Science and Engineering

MONDAY  
MAY 16

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- 10:00 – 12:00 *Registration of participants, discussion*
- 12:00 – 14:00 *Lunch*
- 14:00 – 14:15 **Tomáš Kozubek, Tomáš Karásek: Opening and Introduction of the Czech National Competence Center in HPC**
- 14:15 – 14:30 **Vít Vondrák: News from IT4Innovations**
- 14:30 – 15:15 *Chairman: Vít Vondrák*  
**Josef Šivic: Automatic Visual Recognition: From Pixels to Machines that See, Reason and Act**
- 15:15 – 16:00 **Georg Zitzlsberger: Supervised Training of an Ensemble of Neural Networks with Deep-Temporal and Noisy Remote Sensing Data for Urban Change Monitoring**  
**Khyati Sethia: Automatic Hepatic Vessels Segmentation using Vessel Enhancement filters and 3D-Unet**
- 16:00 – 16:30 *Coffee break*
- 16:30 – 18:00 *Chairman: Tomáš Kozubek*  
*Activities of the Czech National Competence Center in HPC*  
**Tomáš Karásek: Success Stories of Cooperation with Industry**  
**Andreas Lintermann: AI and HPC in Engineering Applications: Contribution to CoE RAISE and Beyond**
- 19:00 *Welcome Party*

# HPCSE 2022

High Performance Computing in  
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TUESDAY  
MAY 17

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- 07:00 – 09:00 *Breakfast*  
*Chairman: Jiří Jaroš*
- 09:00 – 09:45 **Marco Zank: Space-Time Methods and a Modified Hilbert Transform**
- 09:45 – 10:30 **Aamir Saeed Malik: Brain Research: The Potential of High-performance Computing**
- 10:30 – 11:00 *Coffee break*  
*Chairman: Jakub Šístek*
- 11:00 – 12:30 **Eva Havelková: Computational Aspects of Iterative Methods for Volume Reconstruction in Single Particle Analysis**  
**Petr Tichý: On Error Estimation in the Conjugate Gradient Method**  
**Pavel Kůs: A Parallel Domain Decomposition Solver for Immersed Boundary Finite Element Method**  
**Dalibor Lukáš: 3-dimensional Wire-basket Domain Decomposition Combined with Multigrid**
- 12:30 – 14:00 *Lunch*  
*Chairman: Radek Kučera*
- 14:00 – 14:45 **Petr Strakoš: Advanced Visualization and Virtual Reality**
- 14:45 – 15:30 **Radek Fučík: Lattice Boltzmann Method: Basics, Analysis, and Applications**
- 15:30 – 16:00 *Coffee break*  
*Chairman: Radek Fučík*
- 16:00 – 18:00 **Václav Kučera: Computational Challenges on the Border between Compressible and Incompressible Flows**  
**Jakub Fara: Numerical Simulation of a Rebound**  
**Tomáš Oberhuber: TNL: Numerical Library for Modern Parallel Architectures**  
**Pavel Eichler: Turbulent Fluid Flow Simulations through Distributor Plate Using Cumulant Lattice Boltzmann Method on GPU**  
**Jakub Klinkovský: Development and Optimization of a Coupled Multi-GPU LBM-MHFEM Solver for Vapor Transport in Air**  
**Aleš Wodecki: Numerical Optimization of the Dirichlet Boundary Condition in the Phase Field Problem**
- 19:00 – 20:00 *Dinner*
- 20:00 – 22:00 *Poster session*

# HPCSE 2022

High Performance Computing in  
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WEDNESDAY

MAY 18

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07:00 – 09:00	<i>Breakfast</i> <i>Chairman: Jaroslav Hron</i>
09:00 – 09:45	<b>Carsten Burstedde: Adaptive Mesh Refinement in HPC and Applications in the Geosciences</b>
09:45 – 10:30	<b>Matthias Möller: Efficient Solution Techniques for Isogeometric Analysis</b>
10:30 – 11:00	<i>Coffee break</i> <i>Chairman: Lubomír Říha</i>
11:00 – 11:45	<b>Tarek El-Ghazawi: Rebooting Computing – The Search for Post-Moore’s Law Computing Systems</b>
11:45 – 12:30	<b>Jiří Jaroš: Handling C++ Exceptions in MPI Applications</b> <b>Jakub Šístek: GPU Acceleration of a Parallel Domain Decomposition Solver</b>
12:30 – 14:00	<i>Lunch</i>
14:00 – 19:00	<i>Networking time (trip to Pustevny, Wallachian Open Air Museum, or wellness)</i>
19:00	<i>Conference dinner</i>

# HPCSE 2022

High Performance Computing in  
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THURSDAY  
MAY 19

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- 07:00 – 09:00 *Breakfast*  
*Chairman: Jan Martinovič*
- 09:00 – 09:45 **Stephan Hachinger: Environmental Computing: Integrating HPC, IaaS-Cloud Services and Data Management**
- 09:45 – 10:30 **Daniele Cesarini: Microarchitecture performance assessment and energy monitoring of MaX codes through Linux Perf and power management API interfaces**
- 10:30 – 11:00 *Coffee break*  
*Chairman: Tomáš Oberhuber*
- 11:00 – 12:30 **Jaroslav Kruis: Multi-time Step Methods for Lattice Discrete Particle Models**  
**Zdeněk Dostál: Unpreconditioned Hybrid TFETI-DP Methods for the Solution of Huge Problems Discretized by Structured Grids**  
**Ondřej Meca: Highly Parallel Loading and Processing of Unstructured Meshes**  
**Simona Bérešová: Numerical Realization of Bayesian Inversion with Applications to Geosciences**
- 12:30 – 14:00 *Lunch, closing*

# HPCSE 2022

## High Performance Computing in Science and Engineering

## Posters

Alexandros Markopoulos, <u>Petr Beremlijski</u> , Oldřich Vlach, <u>Marie Sadowská</u>	Parallel solution of 3D contact shape optimization problems with Coulomb friction based on TFETI
Michal Béreš	Efficient solution of Stochastic Galerkin problems using the reduced basis method
<u>Jan Březina</u> , Radek Srb, Martin Špetlík, Pavel Exner	VISIP - reproducible, parallel simulation workflows
Vojtěch Címa, Jiří Krůta, Miroslav Kabát, <u>David Číž</u> , Jakub Beránek, Kateřina Slaninová	Diagnosing Diabetic Retinopathy using Artificial Intelligence
<u>Ladislav Foltyn</u> , Pavel Praks, Renáta Praksová, Michal Běloch	Modelling and Optimisation of Urban Meshed Distribution Networks in the Czech Republic
<u>Martin Golasowski</u> , Jiří Nováček, Radek Furmánek, Jan Martinovič	Cryo-Electron microscopy image processing on remote HPC clusters
Mohamad Hayek	HPC-Cloud-Big Data Workflows and Research Data Management: The LEXIS Approach
Jakub Homola	Improving performance of selected BLAS operations using fast on-chip GPU
Markéta Hrabánková	Visualization of scientific data in Blender
Jakub Chlebík	Evolutionary NAS for Topology of an Acoustic Propagation Predictor
Alena Jarolímová, Jaroslav Hron	Determining the Navier slip parameter in the descending aorta using 4D PC-MRI data
Jiří Jaroš	Handling C++ Exceptions in MPI Applications
Marta Jaroš, Jiří Jaroš	k-Dispatch's Performance Modules for Advanced Workflow Submission
Kristian Kadlubiak	Preliminary Performance Evaluation of Modified LFB Method
Ondřej Meca, <u>Ondřej Kozinski</u> , Tomáš Brzobohatý, Lubomír Říha	MESIO: highly-parallel loader of unstructured meshes
Jaroslav Haslinger, <u>Radek Kučera</u> , Kristina Motyčková, Václav Šátek	Numerical Modelling of the Leak Through Semipermeable Walls for 2D/3D Stokes Flow

# HPCSE 2022

## High Performance Computing in Science and Engineering

## Posters

Stanislav Böhm, Jakub Beránek, Vojtěch Cima, Roman Macháček, Vyomkesh Jha, Alfréd Kočí, Branislav Jansík, <u>Jan Martinovič</u>	LIGATE: HyperQueue Scheduler
Ctirad Matonoha, Štěpán Papáček, Jurjen Duintjer Tebbens	On some open questions in a pharmacodynamic model for nuclear receptors behavior
<u>Gabriela Nečasová</u> , Václav Šátek, Petr Veigend	Parallel numeric solution of differential equations
Ondřej Olšák	Comparison of SpFFT and FFTW3 library
<u>Tomáš Panoc</u> , Ondřej Meca, Lubomír Říha, Tomáš Brzobohatý	On the road to the automatic selection of parallel solver parameters for fast computations with evolutionary and swarm algorithms
<u>Pavel Praks</u> , Dejan Brkić, Renáta Praksová, Michal Běloch, Martin Marek, Tomáš Kozubek, Jan Najser	Digital twin technology based on the distributed symbolic regression with applications in the energy sector
<u>Ondřej Salamon</u> , Lukáš Vojáček, Jan Křenek	Approval and Management System for HPC-as-a-Service Middleware HEAppE: Security Aspects
<u>Kateřina Škardová</u> , Radek Galabov, Kateřina Fricková, Tomáš Pevný, Jaroslav Tintěra, Tomáš Oberhuber, Radomír Chabiniok	Combining machine learning and mathematical modeling in estimation of T1 relaxation time from cardiac magnetic resonance imaging data
Ondřej Vysocký, <u>Matej Špeřko</u> , Lubomír Říha	MERIC: energy-efficient approach for your HPC project
Vladimír Ulman	Introduction to Parallel Macro for non-programmers & HPC Workflow Manager for Fiji
Radim Vavřík	POP: A Transversal HPC Centre of Excellence in Performance Optimisation and Productivity
<u>Daniel Velička</u> , Ondřej Vysocký, Matej Špeřko	Analysis and Optimization for Energy Efficiency of GPGPU Accelerated Applications
Ondřej Vysocký	SCALABLE – SCALable Lattice Boltzmann Leaps to Exascale
Georg Zitzlsberger	Exascale-Ready Cross-Domain Workflows Execution: The ACROSS Approach