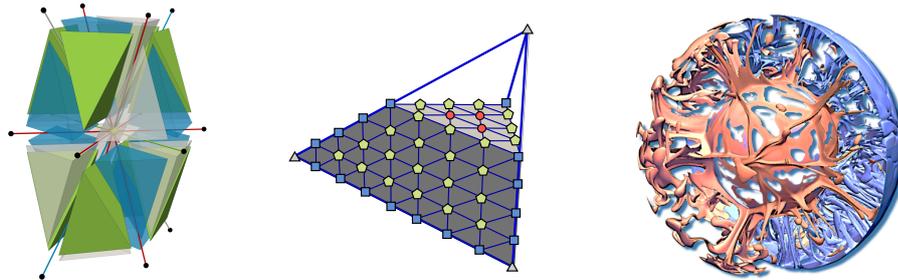


Postdoc-position (m/f/d) Numerical mathematics

Multiphysics simulations for geodynamics on heterogeneous exascale systems

As part of the BMBF project CoMPS, we immediately seek a candidate for a postdoctoral position.



Project summary

The project is a multidisciplinary project combining the fields of mathematics, computer science, geophysics, and high-performance computing. Each field is represented by a dedicated project partner, which brings in their experience. These are the chair of “Numerical Analysis” at TUM, the chair of “System Simulation” at FAU, the chair of “Geophysics” at LMU, and finally, the LRZ with their knowledge about supercomputers.

Firstly, the project aims to improve the performance of the matrix-free finite-element-based framework HyTeG, in particular by techniques for data reduction through surrogate operators. Furthermore, we aim to extend the framework with mixed-precision approaches, which will be implemented and analyzed.

Secondly, we aim at a volume coupling of the high-performance packages waLBerla, HyTeG, and MesaPD to solve complex multiphysics problems. The coupling is done across package boundaries. This also requires more sophisticated approaches in load-balancing.

Finally, the newly developed algorithms will be tested and verified with applications from geodynamics.

Tasks

The specific tasks in the project include

- the efficient implementation of new models, methods, and algorithms into existing high-performance frameworks,
- the fast prototyping of new ideas in individual code,
- an interest in the entire simulation pipeline: starting from simple algorithms to state-of-the-art applications in geophysics executed on supercomputers,
- as well as the presentation of the results to the scientific community in journals, at conferences, and as lecture contributions for students.

Requirements

The position requires the following:

- A Ph.D. in the field of Applied Mathematics, Computer Science, Computational Science and Engineering, or similar.
- Knowledge of numerics as part of a degree program. In particular, detailed knowledge about *finite-element analysis* is an absolute *must*. Familiarity with iterative solvers, preconditioners, multigrid methods, and mixed-precision approaches is optional but extremely useful.
- We require good programming skills and experience in C++ and its common programming idioms and design patterns. Knowledge of MATLAB, Python, Julia, or a similar scripting language is necessary for prototyping.
- Interest and affinity for high-performance computing are necessary for the position. You should have experience with the roofline model and familiarity with a profiler. Experience with GPUs is a bonus.

- Of course, you need fluency in written and spoken English to communicate your ideas in this interdisciplinary project. You should apply for this position if you have the requirements above.

We offer

You can expect from us

- a young, dynamic and international team of scientists from various disciplines, as well as cooperation with international partners,
- an exciting and varied project with many different aspects and possibilities for expansion,
- modern hardware and infrastructure at the workplace, from compute- and GPU servers to supercomputers,
- salary according to the rates of the public service, level E13.

Application

Have we caught your attention for the project and the position? Then apply with your references to this job advertisement by an e-mail to

Prof. Dr. Barbara Wohlmuth (wohlmuth@cit.tum.de)

and send us your curriculum vitae and your final transcript of records from your last period of education (studies/doctorate) together with your letter of application. If you already have relevant publications that should be considered for the application, for instance, your master's thesis, you are welcome to send them to us.

The TUM aims to increase the proportion of women in scientific positions and encourages qualified women to apply. Persons with disabilities will be given preferential consideration if equally qualified.

Any Questions?

If you have any questions in advance regarding content, please do not hesitate to contact

Andreas Wagner (wagneran@cit.tum.de)

Data protection

When you apply for a position with the Technical University of Munich (TUM), you submit personal information. With regard to personal information, please take note of the "Data protection information on collecting and processing personal data contained in your application in accordance with Art. 13 of the General Data Protection Regulation (GDPR)" at <https://portal.mytum.de/kompass/datenschutz/Bewerbung/>. By submitting your application, you confirm that you have acknowledged the above data protection information of TUM.

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