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Editorial: Proceedings of the 3rd Dune User Meeting

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Dune, the Distributed and Unified Numerics Environment[1], has been under continuous development for more than 13 years. Several European institutions participate in this development, and over time, a substantial user community has evolved. In order to establish and foster personal contacts within the community as well as between users and developers, a first Dune User Meeting was held in Stuttgart in 2010, followed by a second one that took place in 2013 in Aachen. In 2015, the third Dune User Meeting was held in Heidelberg from 28th to 29th of September. More than 30 users and developers from five European countries attended, presented Dune-related work and engaged in lively discussions. Ten presentations resulted in contributions to these proceedings.

M. Alkämper and A. Langer demonstrate how the dune-acfem module simplifies the use of dune-fem, using for a case study the minimization of total variation functions.

A. Dedner, S. Girke, R. Klöfkorn and T. Malkmus present dune-Fem-DG, a module that implements the Discontinuous Galerkin method for solving a wide range of nonlinear partial differential equations.

A. Dedner and A. Radcliffe introduce a computational toolbox based on Dune and the software package Bem++[2] for the solution of coupled finite and boundary element systems on multi-core computers.

C. Engwer, C. Gräser, S. Müthing and O. Sander introduce the module dune-Functions providing new interfaces for discrete and non-discrete functions, using type erasure for efficient and readable code.

F. Gruber, A. Klewinghaus and O. Mula introduce dune-DPG, a library for solving partial differential equations with discontinuous Petrov–Galerkin finite elements, a modern approach for formulating inf–sup stable discrete variational formulations.

B. Kane presents higher order discontinuous Galerkin discretizations of a two-phase flow model describing subsurface flow in strongly heterogeneous porous media, considering a fully implicit, locally conservative approach on adaptively generated meshes.

[1]dune-project.org
[2]www.bempp.org

D. Kempf and T. Koch describe a collection of tools for system testing of scientific software.

L. Lubkoll presents a highly efficient library for the automatic differentiation of energy functionals from hyperelasticity.

R. Milk, F.T. Schindler and T. Leibner introduce the DUNE-XT library that complements the core DUNE modules by several concepts and utilities that make generic programming using DUNE even more powerful.

O. Sander, T. Koch, N. Schröder and B. Flemisch introduce DUNE-FOAMGRID, a new implementation of the DUNE grid interface for one- and two-dimensional grids in a physical space of arbitrary dimension, allowing for curved domains and network grids.

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