Institute for Advanced Simulation
Jülich Supercomputing Centre

IAS Seminar

Topic: **Theoretically optimal inexact spectral deferred correction (SDC) methods**

Speaker: Dr. Martin Weiser, Zuse Institute Berlin, Germany

Contents: In several applications, the right-hand side of an initial value problem is obtained by solving a PDE. This is the case, e.g., in long time integration for fatigue or wear simulation. On the one hand, the computational cost of the right-hand side evaluation requires the use of efficient higher order time stepping schemes. On the other hand, the computational cost can be reduced by using coarser grids or fewer iterations in the right-hand side PDE solution, but this impedes the accuracy of the integration.

In this talk, we explore the use of spectral deferred correction (SDC) methods for exploiting this trade-off between accuracy and computational effort. Since SDC methods are fixed point iterations for collocation equations, we study worst case error propagation through the SDC iteration to obtain expressions of the global discretization error in terms of the right-hand side evaluation errors. Work models relating right-hand side errors to computational costs are derived and combined with the error models to obtain an adaptive tolerance selection by minimizing total work.

Finally, we present a priori efficiency estimates and numerical examples for smoothed molecular dynamics.

Time: Monday, 1 August 2016, 14:00

Venue: Jülich Supercomputing Centre, Besprechungsraum 1, building 16.3, room 350

Anyone interested is cordially invited to participate in this seminar.

sgd Prof. Dr. Dr. Thomas Lippert