McGill Computational Science and Engineering Seminar

Friday September 29th at 14:00 in Burnside Hall room 1205

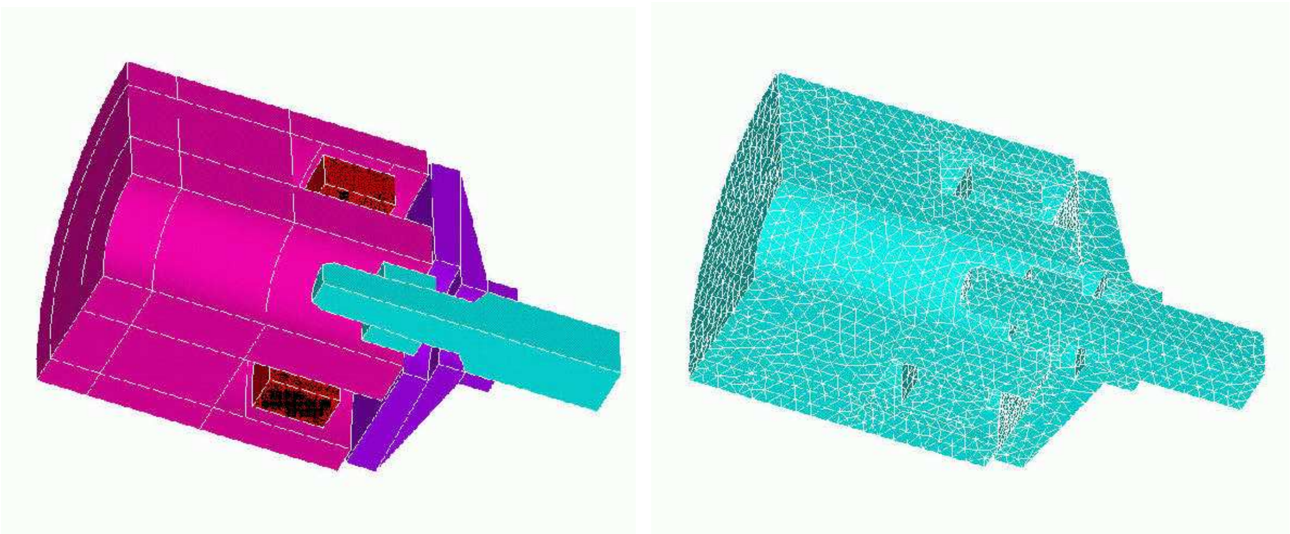
Parallelization of Fast Solvers for Partial Differential Equations

Gundolf Haase,
Johannes Kepler University Linz, Austria .

Nowadays, many calculations from engineering and science that contain partial differential equations cannot be solved analytically. Therefore, the continuous problem will be approximated by a discrete problem. Discretization methods like finite elements, finite differences or finite volumes may produce huge systems of equations which have to be solved. The complexity of these discrete problems is so high that they cannot be solved on todays computers in an acceptable time.

There are two ways to accelerate the computation. First, we will substitute the discrete problem by a sequence of discrete problems with different levels of accuracy with respect to the continuous problem. This approach is called multigrid method. Second, we can speed up the computation by using a parallel computer instead of a sequential one. This requires modifications in sequential algorithms and/or new parallel solution algorithms.

This talk gives an introduction to multigrid methods and the state-of-the-art therein and a general parallelization concept for numerical algorithms will be presented. This leads directly to advanced parallel multigrid solvers and their usage in practical applications.



Electro-magnetic valve from car industry on the left and corresponding grid on the right

Coffee and desserts are served after the seminar at 15:00 in the lounge, Burnside Hall 1024