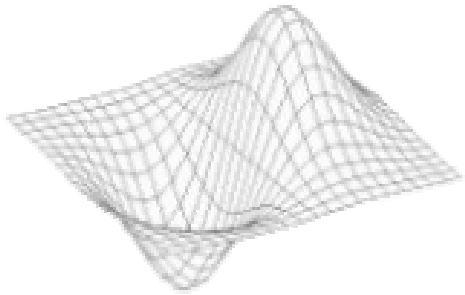
Applied Mathematics Centre of the Institute of Geonics AS CR, Ostrava, Mining branch of the Scientific Research Society (VTS) at the Institute of Geonics AS CR, Ostrava, Information society project „Modelling and simulation of complex technical problems“ & UPPMAX project „Parallel computing in geosciences“

invite you to

WORKSHOP ON NUMERICAL ANALYSIS

Iterative Methods in Modelling and Simulation of Challenging Engineering Problems



The workshop will be held at the conference room of the **Institute of Geonics AS CR, Ostrava** on Tuesday **June 28, 2005 at 13:30**.

The following lectures will be presented:

Iterative solution of boundary value problems via a saddle point formulation
Prof. Owe Axelsson (University of Nijmegen and IG AS CR, Ostrava)

Experience in using iterative solution methods for solving linear systems as arising in modelling of elastic and viscoelastic problems
Dr. Maya Neytcheva (University of Uppsala)

Multilevel methods with aggregations for nonconforming FE systems
Prof. S. Margenov (IPP BAS Sofia)

Workshop coordinator: Prof. R. Blaheta.

Iterative solution of boundary value problems via a saddle point formulation
by Prof. Owe Axelsson (University of Nijmegen and IG AS CR, Ostrava)

General eigenvalue bounds for preconditioning of the saddle point problems are applied for the iterative solution of boundary value problems written on saddle point form by decoupling of edge nodes in each macroelement and introducing of a Lagrange multiplier.

Two methods for the solution of the arising equations are presented. An elementary way of deriving upper bounds of the thereby arising CBS-constant is also presented.

Experience in using iterative solution methods for solving linear systems as arising in modelling of elastic and viscoelastic problems
by Dr. Maya Neytcheva (University of Uppsala)

In the framework of the so-called glacial rebound isostatic model we describe the arising linear systems and discuss methods solve those using preconditioned iterative methods.

We describe preconditioners for matrices of saddle-point form, and in addition, an algebraic multilevel iteration preconditioner based on element agglomeration and approximate Schur complements.

Multilevel methods with aggregations for nonconforming FE systems
by Prof. S. Margenov (IPP BAS Sofia)

The talk is in the spirit of AMLI methods for PCG solution of second order elliptic problems. The linear Crouzeix-Raviart and the bilinear Rannacher-Turek nonconforming finite elements are considered. Let us note, that applying the AMLI framework and the existing theoretical results to nonconforming FEM is not straightforward as the classical construction of hierarchical preconditioner relies on a nested sequence of finite element spaces, in most cases related to nested grids, while the nonconforming FEM on nested grids produces non-nested FE spaces. Therefore, the construction of a hierarchical decomposition for the nonconforming FE spaces is not obvious and also not unique. To fit the classical HB construction techniques to the nonconforming case, we propose new aggregation based splittings for a hierarchical decomposition of the fine grid degrees of freedom.