INVITATION TO THE LECTURE

JUNE 30, 2020   9:00   CONFERENCE ROOM

NUMERICAL METHODS FOR HYDRO-MECHANICS IN STANDARD AND DISTURBED CONTINUA

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The lecture concerns modelling of coupled processes especially coupling of the flow in porous material with mechanical deformation, which is the problem with a lot of applications in geomechanics and biomechanics.

Numerical realization of the hydro-mechanical models can use different finite element techniques for space discretization and an unconditionally stable discretization in time. Arising systems can be solved by iterative methods which utilize the block structure given by the individual processes. These iterations can be also viewed as a way of coupling of the physical processes. The lecture underlines the role of Schur complement and its sparse approximation provided e.g. by the fixed stress technique.

Further, nonlinear problems with the coefficient (hydraulic conductivity) depending on deformation and iterative Picard type solution methods are investigated. One specific application is hydro-mechanics in disturbed continua with the meaning of continua with disturbed zones or fractures, which frequently appear in the analysis of processes in a geological environment with disturbed brittle rocks.

The lecture is partly based on joint work with O. Axelsson, M. Béreš, S. Domesová, D. Horák, J. Kružík and T. Luber and aims at future collaboration in the outlined direction.