Institute of Geonics, Czech Academy of Sciences

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Studentská 1768, Ostrava-Poruba

INVITATION TO THE LECTURE

OCTOBER 18, 2023 9:30 CONFERENCE ROOM

SELECTED NEWTON'S METHODS IN COMPUTATIONAL ELASTO-PLASTICITY

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This talk is about Newton-like methods with the applications to elasto-plasticity and computational geotechnics. It is considered an abstract algebraic system of non-linear equations and its properties are specified to be in accordance with discretized elasto-plastic problems defined in terms of displacements. A particular attention is devoted to associated models with and without hardening and their differences are highlighted on the algebraic level. With respect to the expected properties of elasto-plastic algebraic systems, we introduce convenient Newton-like methods, study their local and global convergence and illustrate it on numerical examples. Especially, we build on the semismooth Newton and its quasi-Newton, smoothing, damped and continuation variants. Finally, for the elasto-plastic models without hardening (elastic-perfect plasticity), we introduce a related auxiliary problem on determining the so-called limit load which is important for safety assessment of structures. An appropriate algorithmic solution is suggested and examples from geotechnical practice are illustrated. The presented results are based on joint work with O. Axelsson, J. Haslinger, J. Karátson, M. Béreš and other coworkers..