# THEORY OF PLASTICITY WITH GENERALIZED HARDENING RULE FOR MODELLING OF MECHANICAL AND NON-MECHANICAL DEGRADATION PROCESSES

## Prof. Claudio Tamagnini
Università degli Studi di Perugia, Itálie

## Přednáška v rámci semináře katedry mechaniky
## ve čtvrtek 14. prosince 2006 od 10:00 hodin v B 367

In the first part of the seminar, an extension of the classical phenomenological theory of plasticity is presented for the mathematical modeling of weakly bonded granular soils, undergoing mechanical as well as non-mechanical degradation processes - such as chemical weathering or thermal softening - considering both small and finite deformation formulations. A characteristic feature of the theory is that the macroscopic effects of interparticle bonding are described by introducing a suitable set of ``bonding-related'' internal variables. Both mechanical and non-mechanical bond degradation processes are dealt with by extending the hardening rule of the material in order to link the evolution of the bonding—related internal variables to both plastic strain rate and the rate of a suitable scalar degradation parameter.

The second part of the seminar deals with the formulation of a fully implicit return mapping algorithm modified to account for the effects of non-mechanical degradation. In the finite deformation setup, the restriction to isotropy allows to formulate the return mapping equations in the space of principal elastic strains. In this way, an efficient and robust integration scheme is developed which can be applied to relatively complex, three-invariant yield surface and plastic potential functions. The resulting algorithm can be linearized in closed form, thus allowing for quadratic convergence in the global Newton iteration.

The performance of the proposed model is demonstrated by means of a series of numerical experiments, including both element tests and simulations of representative boundary value problems of practical interest.

*Přednáška **v angličtině** se koná ve čtvrtek 14.12.2006 od 10 hodin v zasedací síni katedry mechaniky (místnost B 367) v budově Stavební fakulty ČVUT v Praze, Thákurova 7, Dejvice. **Všichni zájemci jsou srdečně zváni.***

*Podrobnější informace poskytne Prof. Milan Jirásek, tel. 224 354 481, Milan.Jirasek@fsv.cvut.cz .*