

MESO-MECHANICAL ANALYSIS OF CONCRETE VIA FEM WITH ZERO-THICKNESS INTERFACE ELEMENTS

Prof. Ignacio Carol

Technical University of Catalonia, Barcelona

**Přednáška v rámci semináře katedry mechaniky
ve čtvrtek 19. června 2008 od 9:45 hodin v B 366**

Mesomechanical analysis is emerging as a powerful tool for the modeling of material behavior. The group of mechanics of materials at ETSECCPB (School of Civil Engineering) of UPC Barcelona has been developing such tools for concrete, with the distinctive feature of the way of representing a key ingredient of concrete behavior: cracking.

All lines in the FE mesh are considered as potential cracks, and, for them, traction-separation constitutive models based on principles of non-linear fracture mechanics have been developed. This approach has been implemented in the context of the FEM, originally in 2D and more recently in 3D, via systematic use of zero-thickness interface elements. The geometry of the particles (larger aggregates only) is generated numerically using Delaunai/Voronoi theory, shrunk to allow space for mortar, and finally the overall specimen is "cut" to its final shape.

Results of mechanical analysis turn out to be very realistic, both mesoscopically (distributed microcrack, coalescence, localization) and macroscopically (average stress-strain curves for specimen). On-going work consists of more complex specimen geometries and loading cases, extension to diffusion-dominated and coupled phenomena such as environmental deterioration (shrinkage, sulfate attack) or high temperatures, and to developing more efficient computational procedures, particularly avoiding the systematic duplication of nodes usually required when using standard double-noded interface elements.

*Přednáška v **angličtině** se koná ve čtvrtek 19.6.2008 od 9.45 hodin v zasedací síni katedry mechaniky (místnost B 366) 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.*