

Proposal for the Minisymposium

IACM-ECCOMAS Congress 2008, Venice, Italy

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Minisymposium Title:

Multi-phase and multi-scale modelling of concrete and concrete structures

Minisymposium Abstract:

The very active research area of nonlinear analysis of engineering structures, especially concrete, reinforced concrete and prestressed concrete, under extreme conditions taking into account the multi-phase and multi-scale aspects of the problem, which is driven by current increase of computational resources, is redefining the traditional frontiers among the engineering disciplines. There exists presently a strong need for better understanding of the limits of the multi-phase and multi-scale methodology in terms of its practical value for modelling the behaviour of a given concrete, reinforced concrete and prestressed concrete structure, regarding the solution cost, result interpretation and model reliability. The issues concerning the formulation of a multi-physics problems, capturing the different phases and scales in the solution incorporating the different numerical models for describing static, dynamic, cyclic, short-term, long-term, etc. material behaviour, providing error estimates and bounds on the computed solution should be examined. Another key issue in that sense concerns our ability to bring these advances in multi-phase and multi-scale nonlinear analysis to bear upon the solution of practically unlimited new capabilities of achieving the optimal design of concrete, reinforced concrete and prestressed concrete structures under all kind of different conditions including extreme one. Namely, the necessity for introducing a refined modelling approach is not only created by available computational tools, but more importantly to provide a better insight into any potential weakness of a concrete structural system on hand and thus achieves a more economical design. The later is becoming of paramount importance nowadays under ever increasing requirements of the market economies, where in a number of very competitive industrial sectors the need for economic design leads naturally towards the criteria based on ultimate limit state of a particular concrete structural system under consideration.