An advanced engineering software for probabilistic-based assessment of concrete structures using nonlinear fracture mechanics

R. Pukl & V. Červenka
Červenka Consulting, Prague, Czech Republic

A. Strauss & K. Bergmeister
Institute of Structural Engineering, University of Applied Sciences, Vienna, Austria

D. Novák
Faculty of Civil Engineering, Brno University of Technology, Czech Republic

Keywords: computer simulation, reliability assessment, concrete structures, probabilistic analysis, fracture mechanics, nonlinear finite element method

ABSTRACT: A probabilistic approach to the nonlinear analysis of civil engineering structures is presented. Finite element software ATENA is used for realistic simulation of concrete and reinforced concrete structures. It is combined with the stochastic package FREET into software system SARA. This system enables to take into account uncertainties and randomness of structural input parameters for the nonlinear analysis. SARA system offers a user-friendly interactive graphical environment as well as an extensive database with statistic information about material, geometrical and other structural and load properties in order to support the user during his task. The basic aim of the probabilistic-based nonlinear analysis is to obtain an estimation of the structural response statistics (failure load, deflections, cracks, stresses, etc.), which is used for sensitivity studies, safety and reliability assessment as well as for identification of structural computer models.