

COLLABORATIVE RESEARCH CENTER 837

INTERACTION MODELING IN MECHANIZED TUNNELING

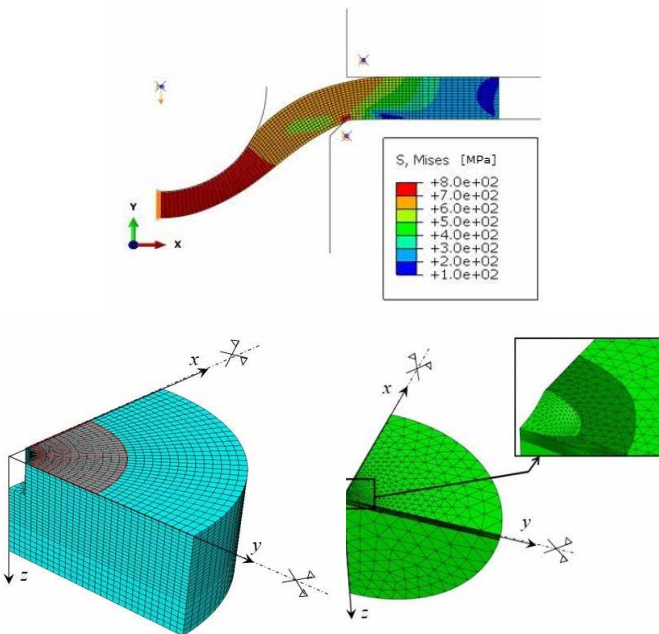
RUB

INVERSE ANALYSES AND QUASI-NON-DESTRUCTIVE TESTS FOR IDENTIFICATION OF BOTH MATERIAL PARAMETERS AND RESIDUAL STRESSES

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Mechanical characterization of materials and assessment of residual stresses are, at present, subjects of growing interest in engineering for the diagnosis of structural components and structures.

In this talk, some research results will be presented about diagnostic analyses, on the basis of experimental data collected from quasi-non-destructive tests, providing practical advantages, with respect to the present practice, such as reduced damages, times and costs and, possibly, execution in situ. The

methodologies presented herein for identifications of parameters are centred, from computational point of view, on inverse analyses based on mechanical and mathematical procedures apt to provide more accurate and reliable parameter estimates. Moreover, stochastic inverse analysis procedures are proposed, based on Kalman filters, for quantification of estimates uncertainty.

The presented practical applications concern metallic structural components and the following combined experiments: Small Punch tests (SP) and specimen extraction (preSP); Hole Drilling (HD) and instrumented Indentation tests (IND). In both cases, an innovative procedure is developed; novelties consist of combined identifications of both material parameters (elastic-plastic, with possible extensions to creep and anisotropic behaviours) and residual stresses, possibly in situ. Consequent reductions of computing times, costs and damages may provide remarkable advantages with respect to the present standardized practices and are evidenced by numerical examples.

Guests are welcome!