Optimization of input parameters for material model of fibre reinforced concrete and application on the numerical simulation of tunnel lining

Tereza Sajdlová, Radomír Pukl

Červenka Consulting, Prague, Czech Republic.

Abstract

Nonlinear finite element simulation has a big potential in the field of fibre reinforced (FRC) structures. Special material models accounting for the high toughness and ductility are available for modeling of FRC-material. Input material parameters for the numerical models are here of crucial importance. They are identified from measured response of four-point bending beams using inverse analysis. The optimal material input data sets are utilized for nonlinear modeling of segmental tunnel lining. Utilization of steel fibre reinforced concrete (SFRC) for segmental tunnel lining promises potential advantages in comparison to the traditionally reinforced concrete (RC) structures - faster manufacturing, lower risk of corrosion, less damage during transport. Results from the experimental and numerical investigations for RC and SFRC segments are presented. Response of the structural members under service loads and their damage under limit loads are evaluated in order to check and confirm suitability of the SFRC segments for practical utilization.

Keywords

FE analysis, segmental tunnel lining, fibre reinforced concrete, non-linear material models, identification of material parameters.