NUMERICAL SIMULATION OF PROJECTILE OBLIQUE IMPACT ON CONCRETE PANEL

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ABSTRACT

Simulations of three experiments on the inclined impact of shells on concrete targets were produced using FEA software. In total 45 models were run to assess the effect of using different material models and contact algorithms on the simulation results. Three material models, the Karagozian & Case (K&C) model, the RHT model and the Continuous Surface Cap Model (CSCM) were considered in the simulations. The effects of five contact modelling options were also considered, including both surface-to-surface and segment-to-segment algorithms, with different contact detection methods applied in each case. The projectile behavior after perforating the targets was compared with the available experimental records. Specifically, its speed, direction, pitch and angular velocity were assessed with the aim of identifying the combination of methods which produced the more accurate solution. The results showed that, when using relatively simple inputs, the K&C and RHT material models produced more accurate results, whilst most CSCM models tended to overestimate the projectile speeds and underestimate projectile rotations. The comparison also showed that segment-to-segment contact algorithms produced improved estimates, as well as being significantly more efficient from an analysis time perspective.