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A Computational Study of Segmented Tungsten Rod Penetration into a Thick Steel Target Plate at High Velocities M. PRESNELL, A. RAJENDRAN, The University of Mississippi — This paper presents results from computational simulations of tungsten alloy segmented rod projectiles (SRP) penetrating an RHA semi-infinite target plate at high velocities. For SRP with an aspect ratio (L/D) = 1/8, a loss in penetration efficiency was seen upon successive segment impacts. Numerical simulations of a configuration in which a tungsten heavy alloy SRP penetrated a thick RHA 4340 steel at 2.6 km/s were performed using the 2006 version of the EPIC a Lagrangian code. The configuration consisted of eight collinear impacts of discs which measured 2mm thick and 16mm in diameter. The numerical simulations considered a range of parameters including element-particle conversion, spacing and number of fragments, failure criterion, and mesh resolution that influenced the Depth of Penetration (DOP). The EPIC results using the element-to-particle conversion capability in the EPIC code are also compared with open-literature DOP data from simulations using an Eulerian finite element code, AUTODYN for a similar configuration. The present results showed a unique phenomenon of back-flowing ejecta from the crater and fragmented segments penetrating the in-coming subsequent segment. The penetration efficiency seems to be influenced by the back-flowing ejecta. Further computational investigation considered additional simulations with an impact configuration designed to minimize the ejecta effects by using washer-shaped segments; however, the results showed insignificant improvement.

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