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Assesment of HEA Plates Behavior at Impact with Hard Penetrators

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Abstract

This paper deals with the subject of finite element modeling of the impact phenomenon between hard penetrators and plates made of High Entropy Alloys (HEAs). For many years, alloying has been employed to give materials desirable qualities. Experimental determinations of the mechanical response of the material at high strain rates by simplified constituent laws are conducted using the Hopkinson Bar System, the method consisting on evaluating the difference of the mechanical impedance between the sample and the bars of the installation. The elastic wave generated by the impact passes through the incident bar, reaching the specimen, at which point a complex process of transmission/reflection is taking place. Due to the fact that experimental impact conditions in the studies were specific to the normal impact, at 0 degrees, the virtual models were made in LSDYNA, 2D axially symmetrical. During the simulation, plastic-kinematic type material models were use, using as input data the values resulting from the static and dynamic characterization tests of the HEA like materials obtained. The simulation results were consistent with the observed experimental results.

Keywords: HEA; armour; high speed impact; ballistic modelling