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Experimental and Numerical Simulation of Flat Nosed Projectile Impact into AL 5083 Plates

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Abstract
In this paper, a study is presented on the experimental and numerical analysis of the failure process in 5, 10 and 15mm thicknesses of Aluminum 5083 subjected to normal impact by flat-nosed projectiles that have been made of Tungsten. To modeling the behavior of materials, Johnson–Cook constitutive equation and fracture criterion are used. In all tests, initial and residual velocities of the projectile are measured and the ballistic limit of each target plate is precisely determined. Based on these measurements, impact versus residual velocity curves of the plates are constructed and the ballistic limit velocity of each target is obtained. Finite element analysis of the problem is carried out using ABAQUS/Explicit finite element code. Results of the numerical analysis are compared with the experiments and good correlation between the two was found. It is shown that especially the results obtained by the finite element approach are encouraging in terms of predicting the response of the plates examined.

Keywords: Impact, Penetration, Ballistic Limit Velocity, Numerical Simulation, ABAQUS,