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A STUDY OF THE TRAJECTORY DEVIATION OF AN AP PROJECTILE WITHIN A TARGET OF AN ALUMINUM ALLOY

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The use of aluminum alloyed with low density materials, such as magnesium, has increased. Aluminum alloys of 6XXX series, such as 6061 T6 and 6351 T6, has many applications, including road equipment and vehicles in general. However, the literature becomes scarce regarding the analysis of this alloy when subjected to medium and high loading rates impacts. This type of interaction, called dynamic behavior, is governed by Hugoniot conservation equations of mass, momentum and energy. Through these equations, it is possible to determine important shock parameters, such as pressure and particle velocity on impact interface. Ballistic impacts on metal targets have been exhaustively studied. Although, the trajectory of the projectile within the target, as well as its change, has been less studied. The present work aimed to analyze the behavior of the trajectory during the penetration of a projectile in a target of aluminum alloy, and compare with computational simulation. Furthermore, through the Hugoniot equations, were also calculated the values of pressure and particle velocity at the projectile-target interface. The impacts were made with 7.62 mm AP (Armor Piercing) projectile at cylindrical targets (billets) of 7" (177.8 mm) diameter and 100 mm thick of 6061 T6 aluminum alloy. The minimum velocity was 791.10 m/s, with a maximum of 887.55 m/s, with respective penetration of 49.55 and 38.15 mm. Considerable deviations of the trajectory of the projectile were observed, mainly driven by thermal and contact factors. Similar behavior was observed also in the computational simulation, whose penetration results varied between 1.18% and 5.76%. The Hugoniot curves of the projectile and target indicated pressure of 8.91 GPa, confirming the shock of the target.