

The Waveshaper Effect on Ta-MS Multiliner Explosive Formed Projectile with Tantalum as Penetrator and Mild Steel as Stabilization Base

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ABSTRACT

Numerical simulation was carried out using Autodyn 2D code to study the formation and tandem behavior of multiliner EFPs (Explosively Formed Projectiles). The main aim of multiliner configuration is to develop tandem behavior and to increase the length of explosively formed projectile in different applications. The high ductility and high dynamic material behavior of Ta (Tantalum) makes it difficult to generate a solid and stable projectile. To get these specific characteristics, mild steel was used for being the most stable liner material in the EFP technology. So when we used mild steel as a stabilization base and tantalum as a penetrator then solid and stable projectile was achieved. The tandem behavior with tantalum-mild steel multiliner configuration was studied. The effects of detonation method, confinement and waveshaper on the multiliner EFP configuration have also been determined by simulation. The detonation method has its effect on the tandem behavior whereas confinement has not. The waveshaper is found to have 40.4% more prominent and faster tandem effect on the multiliner EFPs.

Key Words: Tandem, Multiliner, Detonation Method, Confinement, Waveshaper.

1. INTRODUCTION

EFP formation depends on liner curvature and mass distribution of the liner if warhead configuration including parameters like casing, explosive, liner material etc. remain same. A proper liner material should be use in order to have good penetration capability. Ta is most widely used as a liner material in existing weapon systems because of its superior material properties [1]. The shape and velocity of the penetrator depends on optimization of parameters like liner shape, thickness and material; casing material and thickness; type

of explosive and head height. Head height is very important design parameter and often it is 0.75 calibers [2]. The Ta EFP has 20% better perforation performance than Armco iron (Fe) EFP [3]. But one serious problem is the bad matching of tantalum, it is not possible to produce a defined mass distribution over liner diameter. Although too much ductile, high dynamic material behavior of tantalum makes it difficult to generate a projectile which is a solid, elongated and additionally owns a projectile base which provides good flight stability [4].

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