## Accepted Manuscript

Ballistic Performance of Composite Metal Foams

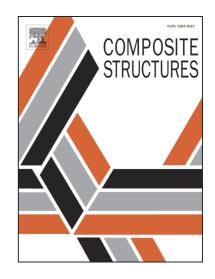
Matias Garcia-Avila, Marc Portanova, Afsaneh Rabiei

 PII:
 S0263-8223(15)00043-4

 DOI:
 http://dx.doi.org/10.1016/j.compstruct.2015.01.031

 Reference:
 COST 6161

To appear in: *Composite Structures* 



Please cite this article as: Garcia-Avila, M., Portanova, M., Rabiei, A., Ballistic Performance of Composite Metal Foams, *Composite Structures* (2015), doi: http://dx.doi.org/10.1016/j.compstruct.2015.01.031

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## **ACCEPTED MANUSCRIPT**

## **Ballistic Performance of Composite Metal Foams**

Matias Garcia-Avila<sup>1</sup>, Marc Portanova<sup>2</sup>, Afsaneh Rabiei<sup>1</sup>\*

<sup>1</sup>Advanced Materials Research Lab, Department of Mechanical and Aerospace Engineering, North Carolina State University, Raleigh, USA

<sup>2</sup> Aviation Applied Technology Directorate (AATD), U.S. Army Research, Development & Engineering Center, Fort Eustis, USA

## Abstract

The application of advance materials to manufacture hard armor systems has led to high performance ballistic protection. Due to its light-weight and high impact energy absorption capabilities, Composite Metal Foams have shown good potential for applications as ballistic armor. A high-performance light-weight composite armor system has been manufactured using boron carbide ceramics as the strike face, composite metal foam processed by powder metallurgy technique as a bullet kinetic energy absorber interlayer, and aluminum 7075 or Kevlar<sup>TM</sup> panels as backplates with a total armor thickness less than 25 mm. The ballistic tolerance of this novel composite armor system has been evaluated against the 7.62x51 mm M80 and 7.62x63 mm M2 armor piercing projectiles according to U.S. National Institute of Justice (NIJ) standard 0101.06. The results showed that composite metal foams absorbed approximately 60-70% of the total kinetic energy of the projectile effectively and stopped both types of projectiles with less depth of penetration and backplate deformation than that specified in the NIJ 0101.06 standard guidelines. Finite element analysis was performed using Abaqus/Explicit to study the failure mechanisms and energy absorption of the armor system. The results showed close agreement between experimental and analytical results.

*Keywords:* Composite Metal Foam, dynamic loading, hollow spheres, powder metallurgy, ballistics, finite element analysis

\*Corresponding author: Dr. Afsaneh Rabiei Department of Mechanical and Aerospace Engineering Download English Version:

https://daneshyari.com/en/article/6706907

Download Persian Version:

https://daneshyari.com/article/6706907

Daneshyari.com