Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Numerical Investigation on the High-Speed Water-Entry Behaviors of Cylindrical, Hemispherical and Conical Projectiles ZI-TAO GUO, WEI ZHANG, XIN-KE XIAO, Hypervelocity Impact Center, Harbin Institute of Technology — The water entry problem is considered as a classic problem which has a research history of more than 70 years, the water-entry process for projectiles with different nose will be significant for related application and experimental design. In this paper, a series of numerical simulations were conducted to study the water-entry behaviors of cylindrical, hemispherical and conical projectiles using the coupled Lagrange-Euler technology in hydro-code AUTODYN-2D. The detailed cavity expansion process and the cavity characteristics of three projectiles in the early stages of water-entry were obtained. The effects of the projectile nose shape and the projectile velocity on the cavity shapes were studied. Simultaneously, the laws of velocity attenuations for three projectiles were also proposed in this study. The results show that the influence of the projectile velocity on the cavity thickness is much larger than that of the projectile nose shapes, but compared with the effect on the cavity length, the nose shape influence shows little difference with that of the impact velocity. For an identical initial projectile velocity, the cylindrical projectile decays the fastest underwater followed by conical projectiles and hemispherical projectiles.

Zi-Tao Guo
Hypervelocity Impact Center, Harbin Institute of Technology

Date submitted: 19 Feb 2009 Electronic form version 1.4