Abstract Submitted
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Shallow-angle water entry of ballistic projectiles[1] TADD T. TRUSCOTT, MIT Department of Mechanical Engineering, JASON T. GOMEZ, Naval Underwater Warfare Center, DAVID N. BEAL, Naval Undersea Warfare Center, ALEXANDRA H. TECHET, MIT Department of Mechanical Engineering — The water-entry of ballistic projectiles is investigated using high-speed digital imaging. Projectiles enter the water at shallow angles to the free surface, $5° - 15°$, without ricochet at Mach numbers between 0.3 and 2.0. Projectile dynamics, critical entry angle, and cavity growth are discussed. Geometric modifications to a projectile allow it to travel large distances underwater assuming a sufficiently large air-cavity is formed after impact, which dramatically decreases drag on the projectile. Results show that successful water-entry occurs for projectiles with modified tip geometries at Mach numbers ranging from 0.3 to 2; these projectile modifications include tip geometry and material properties. A theoretical cavity model compares well with the experimental data and will be discussed for a range of experimental conditions.

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