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Numerical Investigation of Bending-Body Projectile Aerodynamics for Maneuver Control ERIC YOUN, U.S. Military Academy, SIDRA SILTON, U.S. Army Research Laboratory — Precision munitions are an active area of research for the U.S. Army. Canard-control actuators have historically been the primary mechanism used to maneuver fin-stabilized, gun-launched munitions. Canards are small, fin-like control surfaces mounted at the forward section of the munition to provide the pitching moment necessary to rotate the body in the freestream flow. The additional lift force due to the rotated body and the canards then alters the flight path toward the intended target. As velocity and maneuverability requirements continue to increase, investigation of other maneuver mechanisms becomes necessary. One option for a projectile with a large length-to-diameter ratio (L/D) is a bending-body design, which imparts a curvature to the projectile body along its axis. This investigation uses full Navier-Stokes computational fluid dynamics simulations to evaluate the effectiveness of an 8-degree bent nose tip on an 8-degree bent forward section of an L/D=10 projectile. The aerodynamic control effectiveness of the bending-body concept is compared to that of a standard L/D=10 straight-body projectile as well as that of the same projectile with traditional canards. All simulations were performed at supersonic velocities between Mach 2–4.

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