## Abstract Submitted for the DFD10 Meeting of The American Physical Society

Turbulent Flow Past Projectiles: A Computational Investigation<sup>1</sup> IGBAL MEHMEDAGIC, DONALD CARLUCCI, LIAM BUCKLEY, PASQUALE CARLUCCI, U. S. Army, ARDEC, Picatinny Arsenal, SIVA THANGAM, Stevens Institute of Technology, ARDEC-STEVENS COLLABORATION — Projectiles with free spinning bases are often used for smart munitions to provide effective control, stability and terminal guidance. Computational investigations are performed for flow past cylinders aligned along their axis where a base freely spins while attached to and separated at various distances from a non-spinning fore-body. The energy spectrum is modified to incorporate the effects of swirl and rotation using a parametric characterization of the model coefficients. An efficient finite-volume algorithm is used to solve the time-averaged equations of motion and energy along with the modeled form of transport equations for the turbulence kinetic energy and the scalar form of turbulence dissipation. Computations are performed for both rigid cylinders as well as cylinders with free-spinning bases. Experimental data for a range of spin rates and free stream flow conditions obtained from subsonic wind tunnel with sting-mounted spinning cylinders is used for validating the computational findings.

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