Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Turbulent Flow Past Spinning Cylinders[1] IGBAL MEHMEDAGIC, DONALD CARLUCCI, PASQUALE CARLUCCI, U. S. Army ARDEC, SIVA THANGAM, Stevens Institute of Technology — Flow past cylinders aligned along their axis where a base freely spins while attached to a non-spinning forebody is considered from a computational and experimental point of view. The time-averaged equations of motion and energy are solved using the modeled form of transport equations for the turbulence kinetic energy and the scalar form of turbulence dissipation with an efficient finite-volume algorithm. An anisotropic two-equation Reynolds-stress model that incorporates the effect of rotation-modified energy spectrum and swirl is used to perform computations for the flow past axially rotating cylinders. Both rigid cylinders as well as that of cylinders with free-spinning base are considered from a computational point of view. A subsonic wind tunnel with a forward-sting mounted spinning cylinder is used for experiments. Experiments are performed for a range of spin rates and free stream flow conditions. The experimental results of Carlucci & Thangam (2001) are used to benchmark flow over spinning cylinders. The data is extended to munitions spinning in the wake of other munitions. Applications involving the design of projectiles are discussed.

[1]This work was funded in part by U. S. Army ARDEC.

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Date submitted: 07 Aug 2009 Electronic form version 1.4