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Computational Investigations of Flow Past Axially Aligned Rotating Cylinders[1] IGBAL MEHMEDAGIC, PASQUALE CARLUCCI, LIAM BUCKLEY, DONALD CARLUCCI, U. S. Army ARDEC, Picatinny Arsenal, NJ, SIVA THANGAM, Stevens Institute of Technology, Hoboken, NJ — Projectiles with free spinning segments are often used in smart munitions to provide effective control, stability and target guidance. Computational investigations are performed for flow past cylinders aligned along their axis where either the middle or base segment freely spins while attached to a non-spinning fore and/or aft 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 along with the modeled form of transport equations for the turbulence kinetic energy and the scalar form of turbulence dissipation. Experimental data for a range of spin rates and free stream flow conditions obtained from subsonic wind tunnel for flow past axially aligned cylinders with spinning segments are used to validate the computational findings.

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