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Particle Sorting by Aerodynamic Vectoring ZACHARY HUMES, Utah State University, BARTON SMITH, Utah State University, ANGELA MINICHIELLO, CastleRock Engineering Inc. — An experimental and numerical demonstration of a new, non-contact particle sorting technique called Aerodynamic Vectoring Particle Sorting (AVPS) is presented. AVPS uses secondary blowing and suction control flows to sharply turn a 2D, particle-laden jet. As the jet is turned, particles present in the flow experience a resultant force, dependent upon their size and due to the combined effects of pressure, inertia, and drag. Since the balance of these forces determines the particle's trajectory, turning the flow leads to a separation of particles downstream. This simple, low-pressure-drop sorting technique classifies particles with less risk of damage or contamination than currently available sorting devices. AVPS is experimentally demonstrated using a rectangular air jet. Particle size and trajectory are measured using the Shadowgraphy method. Numerical simulations are performed using the commercial CFD solver FLUENT to calculate the 2D turbulent vectored jet flow field using a RANS approach. FLUENT's discrete phase model is used to simulate the trajectory of particles present in the flow field. Examination of the mean and the standard deviation of measured and computed particle trajectories is used to determine the range of particle sizes that can be effectively sorted using AVPS.

Barton Smith
Utah State University

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