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Simultaneous velocity measurements of particle and gas phase in particle-laden co-flowing pipe jets[1] ISAAC SARIDAKIS, TIMOTHY LAU, Centre for Energy Technology, School of Mechanical Engineering, University of Adelaide, Australia, LYAZID DJENIDI, School of Engineering, University of Newcastle, Australia, GRAHAM NATHAN, Centre for Energy Technology, School of Mechanical Engineering, University of Adelaide, Australia — Simultaneous planar velocity measurements of both the carrier gas and particles are reported of well-characterized particle-laden co-flowing pipe jets. It is proposed to present measurements that were obtained through application of a median-filter discrimination technique to separate the Particle Image Velocimetry (PIV) signals of the 0.5μm diameter fluid tracers from those of the larger particles of diameter 20μm and 40μm. Instantaneous particle and fluid planar velocity distributions were measured for three Reynold's numbers ranging from 10,000 to 40,000 and five Stokes numbers from 1 to 22, at a jet bulk fluid velocity to co-flow velocity ratio of 12. Selected results will be presented which show that the slip velocity is dependent on the local Stokes number. These are the first simultaneous carrier gas and particle velocity measurements in particle-laden jets and provide new understanding of fluid-particle interactions.

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