

Abstract Submitted  
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**A Comparison of Single and Multiphase Turbulent Jets, Pure and Forced Plumes at Moderate Reynolds Numbers.**<sup>1</sup> G.N. TAUB, S. BALACHANDAR, University of Florida, F. PLOURDE, Ecole National Supérieure De Mécanique et D'Aérotechnique, France — Turbulent axisymmetric shear flows, such as jets and plumes arise often in industrial applications and environmental studies. The recent Deep Water Horizon oil spill in the Gulf of Mexico is one example which brought to light the need for a greater understanding of the turbulent behavior of such flows. The results of Direct Numerical Simulations of single phase pure jets ( $Re=2000$ ), pure plumes ( $Gr = 2000^2$ ) and forced plumes ( $Re=1684$ ,  $Ri=0.025$ ), where both buoyancy and initial momentum are present, will be compared and contrasted. In addition to the mean flow behavior, second and third order statistics will be presented as well as the turbulent energy balance for all three flows. In the case of the forced plume, the transition from jet like behavior near the source of initial momentum to plume like behavior in the far field will be discussed. Preliminary results of laboratory experiments and Direct Numerical Simulations of multiphase forced plumes will also be presented.

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