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Experiments on the global instability of confined axisymmetric dense wakes. LARRY LI, MATTHEW JUNIPER, University of Cambridge — Recent theoretical studies [M. Juniper, J. Fluid Mech. **565**, 171-195 (2006); M. Juniper and S. Candel, J. Fluid Mech. **482**, 257-269 (2003)] predict that confinement increases the hydrodynamic instability of wakes by causing the transition from convective to absolute instability to occur at lower values of shear. Experimental evidence supporting this prediction is presented here for a confined, axisymmetric wake at density ratios, $S \equiv \rho_1/\rho_2 > 1$ (i.e. dense wake). The wake was produced by a pair of convergent nozzles mounted concentrically, one within the other, in a low-turbulence wind tunnel facility. Variations in S were achieved by employing two high density gases ($S = 1.53$ and 5.11) in the inner flow with air in the outer flow. For a fixed S, there existed a critical value of shear above which dominant peaks appeared abruptly in the near-wake velocity spectra, as quantified by hot-wire anemometry. Corresponding high-speed video sequences revealed large-scale, sinuous wake motions. Results on the confined wake's response to externally-applied, acoustic forcing are also presented. The presence of discrete spectral peaks and coordinated instability oscillations suggests the emergence of a self-sustained, global mode.

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