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A physical mechanism for the primary instability of axisymmetric wakes past bluff bodies JACQUES MAGNAUDET, CNRS/IMFT — The occurrence of the primary instability of the axisymmetric wake past an oblate bubble with a stress-free condition at its surface was studied by means of DNS (Magnaudet & Mougin, *J. Fluid Mech.* in press). The results suggest that the base flow becomes unstable when the derivative of the vorticity in the direction perpendicular to the symmetry axis vanishes within a small subregion of the near wake where the iso-vorticity lines have to turn sharply. Existence of this region is specific to axisymmetric flows and results from the combination of the Prandtl-Batchelor constraint within the standing eddy and the condition of weak vorticity on the rear part of the body surface. Examination of the azimuthal vorticity balance indeed suggests that the flow cannot remain stable at high enough Reynolds number when the above condition is fulfilled. The generality of this mechanism is discussed.

Prefer Oral Session
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