Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Global stability analysis of the flow behind an axisymmetric blunt based body PHILIPPE MELIGA, DENIS SIPP, ONERA, Meudon, FRANCE, JEAN-MARC CHOMAZ, LadHyX, Palaiseau, FRANCE — A three-dimensional global mode linear analysis of the flow behind an axisymmetric blunt-based body is numerically investigated. The two-dimensional steady base flow is obtained from time-dependent simulations based on a finite-element spatial discretization and a Lagrange-Galerkin temporal discretization. The generalized eigenvalue problem is solved by use of the Implicitly Restarted Arnoldi method. We show that a helical (m=1) non-oscillating mode, whose eigenmode is mainly located in the recirculating area, becomes unstable at a critical Reynolds number Re=295, and that a helical oscillating mode, whose eigenmode exhibits the spatially periodic downstream structure characteristic of the oscillatory wake instability, becomes unstable at a supercritical Reynolds number Re=409 with a frequency fD/U_∞=0.14. As a step to address the relevance of the second bifurcation, we then consider the non-linear saturation amplitude of the non-oscillating mode by solving the amplitude equation associated with the first bifurcation.

Philippe Meliga
ONERA, Meudon, FRANCE

Date submitted: 04 Aug 2006 Electronic form version 1.4