Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

**Stability and dynamics of supersonic axisymmetric bluff-body wake flows** SIMON GALIVEL, SAMIR BENEDDINE, DENIS SIPP, ONERA, SEBASTIEN ESQUIEU, CEA — The dynamics of separated wake flows behind an axisymmetric bluff body, where complex aerodynamic phenomena occur, is of primary importance for a correct estimation of its drag and trajectory. Those phenomena have been widely studied in incompressible flows, showing the existence of two bifurcations in the laminar regime which first steadily breaks the axisymmetry of the baseflow and then generates vortex shedding. The corresponding laminar large scale structures persist in turbulent regime. Unfortunately, an equivalent study for supersonic conditions is absent from the literature. Thus this work focuses on a supersonic wake of such bluff body ($M = 4$) in the laminar regime. A detailed study of unsteady simulations shows several instabilities: the breaking of the axisymmetry, complex flapping and rotation of the backflow region and an oscillating expanded region. Global stability analyses are then carried out to identify and study the flow mechanism of these instabilities. It highlights the driving role of the shear layer, of the backflow region, and of the expansion fan, and shows that the dynamics is significantly different from its incompressible counterpart.

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Date submitted: 02 Aug 2019 Electronic form version 1.4