Abstract Submitted
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Bifurcations in axisymmetric wakes and their stabilization by base bleed[1] ENRIQUE SANMIGUEL-ROJAS, PATRICIO BOHÓQUEZ, ALEJANDRO SEVILLA, CARLOS MARTÍNEZ-BAZÁN, Universidad de Jaen — We investigate the instability properties of the laminar incompressible flow around a cylindrical body with a rounded nose and length-to-diameter ratio 2, at zero angle of attack, combining experiments, three-dimensional direct numerical simulations and a global linear stability analysis. The direct numerical simulations and the global stability results are in excellent agreement in their prediction of a first stationary and three-dimensional bifurcation in the wake, which takes place at $Re_{c1} \approx 325$. Moreover, both the experiments and the numerical simulations show the existence of a second oscillatory bifurcation at $Re_{c2} \approx 400$. However, although the global stability analysis does also predict the existence of an oscillatory bifurcation, it is at a considerably larger value of $Re \approx 518$. The disagreement between the global linear analysis and the experimental and numerical results in the prediction of the oscillatory bifurcation is investigated and justified in terms of the flow field used to performed the stability analysis. In addition, we report the existence of two critical values for the bleed coefficient, defined as the bleed-to-free-stream velocity ratio, to re-stabilize the wake to its axisymmetric steady state.

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