Stability effects of a base cavity on the wake of axisymmetric bluff bodies\textsuperscript{1} ENRIQUE SANMIGUEL-ROJAS, PATRICIO BOHORQUEZ, JOSÉ IGNACIO JIMÉNEZ-GONZÁLEZ, CARLOS MARTÍNEZ-BAZÁN, University of Jaen (Spain) — We extend our previous research on the instability properties of the laminar incompressible flow around a cylindrical body with a rounded nose and length-to-diameter ratio $L/D = 2$, at zero angle of attack, by analyzing the effects of a cylindrical base cavity of length $h$ and diameter $D_c$. We combine experiments, three-dimensional direct numerical simulations and a global linear stability analysis. The direct numerical simulations and the global stability results accurately predict the stabilizing effect of the cavity on the stationary, three-dimensional bifurcation in the wake as $h/D$ increases. In fact, it is shown that, for a given value of $D_c/D$, the critical Reynolds number for the steady bifurcation, $Re_{cs}$, increases monotonically as $h/D$ increases, reaching an asymptotic value, that depends on $D_c/D$, at $h/D \approx 0.7$. On the other hand, for a fixed value of $h/D$, $Re_{cs}$ exhibits a maximum at $D_c/D \approx 0.8$. Similar behavior has been observed experimentally and numerically for the second, oscillatory bifurcation, and its associated critical Reynolds number, $Re_{co}$.

\textsuperscript{1}Supported by the projects DPI2008-06624-C02 and P07-TEP02693.