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Global mode analysis of the stabilization of bluff-body wakes by base bleed E. SANMIGUEL-ROJAS, A. SEVILLA, C. MARTÍNEZ-BAZÁN, Universidad de Jaen (Spain) — Base bleed is a simple and well-known means of stabilizing the wake behind slender bodies with a blunt trailing edge. In the present research, we investigate the global instability properties of the laminar-incompressible flow using a spectral domain decomposition method to perform the global stability analysis. In particular, we describe the flow instability characteristics as a function of the Reynolds number, Re=$\rho W_\infty D/\mu$, and the bleed coefficient, defined as the bleed-to-freestream velocity ratio, $C_b = W_b/W_\infty$, where D is the diameter of the body, ρ and μ the density and viscosity of the free stream, respectively. A first stationary bifurcation for, Re $\simeq$ 364, is found, and a second oscillatory bifurcation for, Re $\simeq$ 598, with a Strouhal number, St= 0.105, both for the most unstable azimuthal mode $|m|$= 1. We also report the existence of a critical bleed coefficient to stabilize both the first, $C^*_{b1} = C^*_{b1}(Re)$, and the second, $C^*_{b2} = C^*_{b2}(Re)$, bifurcations such as $C^*_{b1} > C^*_{b2}$ for the range of Reynolds number under study, $0 \leq Re \leq 2000$. For $Re > 600$ the same kind of bifurcations are found for the azimuthal modes $|m|$= 2 and $|m|$= 3, which exhibit similar behaviors as the $|m|$= 1 mode with respect to the critical bleed coefficient.

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