Abstract Submitted
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On the stabilization of bluff-body wakes by low-density base bleed[1] CARLOS MARTINEZ-BAZAN, ALEJANDRO SEVILLA, Dpto. de Ingenieria Mecanica y Minera, Universidad de Jaen (Spain), FLUID MECHANICS TEAM — Base bleed is a simple and well-known means of stabilizing bluff-body wakes at supercritical Reynolds numbers. In the present research we consider a generalization of previous works by studying the effect of the bleed-to-freestream density ratio, $S = \rho_b/\rho_\infty$, on the stability properties of the wake behind an axisymmetric, slender body with a blunt trailing edge. Since a lower density in the slow stream is known to inhibit absolute instability, here we restrict our attention to the case of light bleed fluid, $S < 1$. This mechanism is shown to inhibit the wake for values of the bleed coefficient, defined as the bleed-to-freestream velocity ratio $C_b = u_b/u_\infty$, smaller than those obtained in the homogeneous case of $S = 1$. Our approach consists of obtaining the basic, axisymmetric flow by integration of the full set of Navier-Stokes and species conservation equations in cylindrical coordinates, and calculating its linear, local, spatio-temporal stability downstream of the body base. The analysis predicts a critical bleed coefficient C_b^*, which decreases with the density ratio according to the linear law $C_b^* \simeq 0.01 + 0.05\,S$ for $0.1 \leq S \leq 1$.

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