

Abstract Submitted  
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**Stability and adjoint-based control of a confined impinging jet**  
JEAN-MARC CHOMAZ, LadHyX-CNRS, PHILIPPE MELIGA, LadHyX — We investigate numerically the dynamics of a laminar plane jet impinging on a flat plate in a channel. A global stability analysis is carried out and shows that, for a strong confinement, the two-dimensional steady flow is unstable to three-dimensional steady perturbations. We then use adjoint methods and sensitivity analyses to assess the efficiency of a 3-D harmonic or 2-D steady control to stabilize the leading 3-D global mode, by means of either bulk or wall forcing. This allows to identify flow regions of particular interest, and suggests different locations of the actuator depending on the control method. These concepts will be applied to two open-loop control strategies in which we introduce into the flow a small control device chosen as a cylinder or a flat-plate airfoil, modeled by the drag or lift force it exerts on the flow. A physical interpretation for the stabilizing effect of such control methods will be proposed, based on the competition between production and advection of disturbances.

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