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Short-wave analysis of 3D and 2D instabilities in a driven cavity PAOLO LUCHINI, FLAVIO GIANNETTI, VINCENZO CITRO, Università di Salerno - DIIN — The short-wave asymptotic approximation of inviscid instabilities proposed by Bayly (*Phys. Fluids* **31**, 1988) and Lifschitz & Hameiri (*Phys. Fluids A* **3**, 1991) is here applied to the dominant (three-dimensional) instability of two-dimensional flow in either an open or a closed driven cavity, and compared to the structural sensitivity obtained by direct-adjoint computation. The comparison shows that the structural sensitivity of the eigenmode is indeed localized around the critical streamline identified by short-wave asymptotics, and that the latter provides a reasonably good expression of even the first unstable eigenvalue at critical Reynolds number. Curiously enough, the same approximation appears also to apply with success to the two-dimensional instability of the same flow, despite the absence of a large spanwise wavenumber to be used as an expansion parameter. The theoretical justification of this extension, and the importance of phase quantization along the trajectory, will be discussed.

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