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Eigenmodes of the cavity-driven boundary layer flow JÉRÔME HOEPFFNER, IRPHE — The two-dimensional eigenmodes of a cavity-driven separated boundary layer are computed, and are used for analysis of the stability properties of this flow. The local convective instability of initial conditions along the shear layer of the recirculating cavity is seen to be represented in the basis of the eigenmodes by a temporal transient energy growth. The structure of the global eigenmodes and corresponding growth rate can be explained with a simple vortex convection problem, with growth along the shear layer due to inflectional instability, and disturbance regeneration at the upstream lip of the cavity due to a pressure perturbation. We finally analyze the exponential spatial growth of the temporally damped eigenmodes in the downstream direction, and discuss that this is a common features of eigenmodes generated in a strongly nonparallel pocket of an otherwise parallel flow.

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