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Optimal energy growth in swept Hiemenz flow ALAN GUEGAN, PATRICK HUERRE, PETER SCHMID, LadHyX, CNRS-Ecole Polytechnique, France — It has been shown in Guégan, Schmid & Huerre 2006 that the kinetic energy of optimal Görtler-Hämmerlin (GH) perturbations in swept Hiemenz flow can be transiently amplified by two orders of magnitude at Reynolds numbers ranging from 400 to 1000 and spanwise wavenumbers from 0.1 to 0.5. In this configuration an array of counter-rotating chordwise vortices is compressed by the spanwise shear, as in the well-known Orr mechanism. We show that stronger transient growth can be achieved when the GH assumption is relaxed. In this case the optimal initial perturbation consists in vorticity sheets stacked in the chordwise direction, at a small angle from the symmetry plane of the base flow. Although the spatial structure of the GH perturbations is lost, wall-normal-spanwise plane cuts show that the amplification mechanism is mostly unchanged. The GH assumption thus provides a reasonably good estimate for transient energy amplification levels in swept Hiemenz flow. Extension of this analysis to the spatial growth problem is under way and preliminary results will be shown.

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