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Secondary optimal growth in channel flows CARLO COSSU, LadHyX, CNRS-Ecole polytechnique, MATTIAS CHEVALIER, Swedish Defence Agency (FOI), DAN S. HENNINGSON, KTH Mechanics — We compute the linear 'secondary' optimal transient energy growth supported by an unsteady optimally growing basic flow in a plane channel. This primary flow is generated by giving as initial condition the Poiseuille solution plus 'primary' optimal spanwise periodic vortices of finite amplitude A_0 which evolve into transiently growing streaks. For small amplitudes A_0 of the primary initial vortices, the secondary optimal perturbations and energy growth are almost identical to the primary ones. For larger amplitudes, however, a distinct strong secondary growth mechanism sets in which is related to the modal secondary instability of the streaks. Therefore, for initial conditions of sufficiently large amplitude, the optimal perturbations leading to maximum transient growth in a plane channel flow do not consist any more in streamwise vortices alone but in more complicated structures.

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