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Transient growth on streaks LUCA BRANDT, JEROME HOEPFFNER, DAN HENNINGSON, KTH Mechanics, SE 10044 Stockholm, Sweden — The behaviour of linear perturbations developing on boundary layer streamwise streaks assumed steady and spanwise periodic is investigated for streak amplitudes below or at the onset of the inflectional secondary instability. The input velocity fields leading to an output flow of maximum possible energy at a given time are first computed. It is found that significant transient growth may occur for both sinuous and varicose modes. The transient growth is larger for sinuous modes, it increases with the Reynolds number and it is already relevant at amplitudes well below the threshold for the onset of secondary instabilities. The optimal initial condition consists of velocity perturbations tilted upstream from the wall. The optimal response is still localized in the areas of largest shear but it is tilted in the flow direction. The largest velocity component of the optimal disturbance is the spanwise whereas the optimal response is strongest in its streamwise velocity component. To quantify the realizability of this growth process in noisy situations a stochastic approach is followed. A receptivity coefficient is defined by relating the variance of the environmental disturbance to that of the optimal flow response at a later time.

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