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Stabilization of Tollmien-Schlichting waves by finite amplitude optimal streaks in the Blasius boundary layer

In this Letter we show by numerical simulation that streamwise streaks of sufficiently large amplitude are able to stabilize Tollmien-Schlichting waves in zero pressure gradient boundary layers at least up to Re = 1000. This stabilization is due to the spanwise averaged part of the nonlinear basic flow distortion induced by the streaks and occurs for streak amplitudes lower than the critical threshold beyond which secondary inflectional instability is observed. A new control strategy is implemented using optimal perturbations in order to generate the streaks. ©2000 American Institute of Physics.