

Abstract Submitted  
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**Receptivity of the Boundary Layer to Vibrations of the Wing Surface**<sup>1</sup> TOMASS BERNOTS, ANATOLY RUBAN, DAVID PRYCE, Imperial College London, LAMINAR FLOW CONTROL UK GROUP TEAM — In this work we study generation of Tollmien-Schlichting (T-S) waves in the boundary layer due to elastic vibrations of the wing surface. The flow is investigated based on the asymptotic analysis of the Navier-Stokes equations at large values of the Reynolds number. It is assumed that in the spectrum of the wing vibrations there is a harmonic which comes in resonance with the T-S wave on the lower branch of the stability curve. It was found that the vibrations of the wing surface produce pressure perturbations in the flow outside the boundary layer which can be calculated with the help of the piston theory. As the pressure perturbations penetrate into the boundary layer, a Stokes layer forms on the wing surface which appears to be influenced significantly by the compressibility of the flow, and is incapable of producing the T-S waves. The situation changes when the Stokes layer encounters a roughness; near which the flow is described using the triple-deck theory. The solution of the triple-deck problem can be found in an analytic form. Our main concern is with the flow behaviour downstream of the roughness and, in particular, with the amplitude of the generated Tollmien-Schlichting waves.

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