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Analysis of Stability of Channel Flow Subject to Distributed Heating JERZY M. FLORYAN, MOHAMMED HOSSAIN, University of Western Ontario — The linear stability of channel flow between two horizontal parallel walls in the presence of distributed wall-heating has been investigated. The case of periodic heating applied at the bottom wall has been considered in details. This heating results in the creation of zones of fluid with alternatively increased and decreased temperature. The mean flow and the linear stability equations have been solved using spectral methods. Two types of instability, i.e., vortex instability and traveling wave instability, have been examined. For the traveling wave instability two and three dimensional oblique waves have been considered. It has been found that from among various possible forms of disturbances the streamwise vortices appear at the lowest value of the Rayleigh number if the flow Reynolds number is sufficiently small, and two-dimensional Tollmien-Schlichting (TS) waves appear first if the flow Reynolds number is sufficiently large. The conditions when the two-dimensional waves dominate are similar to those found in the case of isothermal flow.

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