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**Flow structure and stability analysis for back-step flow** ADRIAN MIHAIESCU, HORIA HANGAN, ANTHONY STRAATMAN, Faculty of Engineering, University of Western Ontario, London, Ontario, Canada, JOSE EDUARDO WESFREID, Physique et mecanique des milieux heterogenes, ESPCI, Paris, France
— The structure and stability of the flow over a backward-facing step are studied using direct numerical simulation. Two-dimensional and three-dimensional simulations are conducted at a Reynolds number between 50 and 600. The reattachment length and velocity profiles are in agreement with the experimental and numerical results reported by J.-F. Beaudoin et al.(2003). The Rayleigh discriminant and the Gortler number are calculated for the stability study. Present results identify the same regions of instability as previously found by the two-dimensional simulations of Beaudoin et al., but the values of both Rayleigh discriminant and Gortler number are significantly different. Two Eckman structures close to the lateral walls, followed inside the flow domain by two Gortler structures, located downstream the step are identified. It is shown that other Gortler structures appear when a spanwise periodic perturbation of the inflow velocity is imposed. However, these longitudinal structures depend on the inflow conditions.

Adrian Mihaiescu
Faculty of Engineering, University of Western Ontario, London, Ontario, Canada

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