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Flow structure and stability analysis for back-step flow
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don, Ontario, Canada, JOSE EDUARDO WESFREID, Physique et
mecanique des milieux heterogenes, ESPCI, Paris, France — The struc-
ture and stability of the flow over a backward-facing step are stud-
ied 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 re-
gions of instability as previously found by the two-dimensional simula-
tions 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.

Prefer Oral Session

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