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Secondary instability of wall-bounded shear flows. (English) Zbl 0556.76039
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The process by which a laminar shear flow undergoes transition to turbulence is of fundamental fluid dynamical interest. In this paper, this question is addressed from the view point of stability theory. The primary instabilities of wall-bounded shear flows and the canonical cases of plane Poiseuille flow and pipe Poiseuille flow are discussed. The nonlinear saturation process of primary instability is also treated. The concept of linear secondary instability is introduced and applied to the canonical Poiseuille flows. The structure and dynamics of the secondary instability are analyzed and the theory is applied to plane Couette flow and the boundary layer over a flat plate. The extent to which the secondary instability introduced in the paper relates the actual transition process of laminar shear flow to turbulence is also examined.

Reviewer: [T.K.V.Iyengar](#)

MSC:

[76F10](#) Shear flows and turbulence
[76E99](#) Hydrodynamic stability

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[transition to turbulence](#); [primary instabilities](#); [linear secondary instability](#); [plane Couette flow](#)

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