From isotropic turbulence to transition in plane channel flow

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Abstract

In plane Poiseuille flow, somewhat beyond a critical value of the Reynolds number, laminar flow co-exists with turbulent stripes. We transpose modeling concepts, which were derived for the case of statistically isotropic turbulence, to this case. Thereby it is shown that the kinetic energy balance around the onset of turbulent flow in plane channel flow can be described by a simple model-equation. We first validate our ideas in the isotropic setting using two-point closure technique. Subsequently we assess the ideas applied to channel flow using high resolution direct numerical simulations. A 2 page abstract can be found in the supplementary files

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