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Anisotropic Decay of Turbulence in Plane Couette-Poiseuille Flow TAO LIU, Paris Diderot University, BENOIT SEMIN, PMMH, ESPCI Paris, CNRS, LUKASZ KLOTZ, IST AUSTRIA, RAMIRO GODOY-DIANA, JOSE EDUARDO WESFREID, PMMH, ESPCI Paris, CNRS, TOM MULLIN, Mathematical Institute, University of Oxford — We report the results of an experimental investigation into the decay of turbulence in Couette-Poiseuille flow using so-called 'quench' experiments where the flow laminarises after a sudden reduction in Reynolds number. We measured the velocity field in the xz plane, where x is the streamwise and z the spanwise directions respectively. We show that the decay of turbulence is anisotropic: the spanwise velocity u_z, corresponding to streamwise vortices (or rolls), decays faster than the streamwise velocity u_x, corresponding to elongated regions of higher or lower velocity named streaks. We define turbulent fractions F_x and F_z from the streamwise x and spanwise z velocity components, respectively, and examine their decay as a function of the Reynolds number. The decay of F_z is linear and always faster than the one of F_x, while the decay of the spanwise energy E_z fits an exponential. We characterized the decay rate A_z of E_z and the decay slope a_z of F_z as a function of Re. We found that the obtained values are independent of the noise levels. Both the decay rates A_z and the decay slopes a_z scale in the form $\propto (Re_* - Re)$, with Re_* close to $Re = 670$ above which turbulence becomes self-sustained.

Tao Liu
Paris Diderot University

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