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Decay of turbulence in a duct with transverse magnetic field OLEG ZIKANOV, University of Michigan - Dearborn, DMITRY KRASNOV, THOMAS BOECK, Ilmenau University of Technology, SEMION SUKORIANSKY, Ben-Gurion University of the Negev — Decay of honeycomb-generated turbulence in a duct with a static transverse magnetic field is studied via high-resolution direct numerical simulations. The simulations follow the experimental study of Sukoriansky et al, 1986, in particular the paradoxical observation of high-amplitude velocity fluctuations, which exist in the downstream portion of the flow when the strong transverse magnetic field is imposed in the entire duct including the honeycomb exit, but not in other configurations. It is shown that the fluctuations are caused by the large-scale quasi-two-dimensional structures forming in the flow at the initial stages of the decay and surviving the magnetic suppression. Statistical turbulence properties, such as the energy decay curves, two-point correlations and typical length scales are computed. The study demonstrates that turbulence decay in the presence of a magnetic field is a complex phenomenon critically depending on the state of the flow at the moment the field is introduced.

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