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On upper bounds for the energy dissipation rate in turbulent shear flow

The background flow method of Doering and Constantin is known to provide the best rigorous bound for the time-averaged dissipation rate in turbulent (incompressible) shear flow if it is equipped with an additional balance parameter introduced by Nicodemus, Großmann and Holthaus. By computing exactly the best constant in a one-sided Poincaré inequality with weights and exploiting the solenoidality of the flow field more efficiently we can improve this bound by about 30 percent, without the use of any numerical device. (Joint work with M. Wiegner, RWTH Aachen) Ref. B. J. Schmitt and M. Wiegner, Remarks on the asymptotic bounds for the energy dissipation in the Couette problem. Submitted for publication (1998).