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”Crossover between local and non-local scaling regimes in turbulent compressible fluid: Renormalization group analysis

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We study scaling properties of the model of fully developed turbulence of a compressible fluid, based on the stochastic Navier-Stokes equation, by means of the field theoretic renormalization group (RG). This model was already considered earlier in [N.V. Antonov, M.Yu. Nalimov, and A.A. Udalov, Theor. Math. Phys., Vol. 110, No. 3, 1997]. The scaling properties in that approach are related to fixed points of the RG equation. Here we study the possibility of existence of other scaling modes and the opportunity of crossover between them. This may take place in some other space dimensions, particularly in $d = 4$. The new mode can arise there and then by continuity move into $d = 3$. Our calculations have shown that there really exists an additional fixed point, that may govern scaling behaviour. Advection of passive scalar fields is also considered.

Summary

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