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Energy Dissipation in Fractal-Forced Flows ALEXEY P. CHESKIDOV[1], CHARLES R. DOERING[2], NIKOLA P. PETROV[3], University of Oklahoma — The rate of energy dissipation in solutions of the body-forced 3D incompressible Navier-Stokes equations is rigorously estimated with a focus on its dependence on the nature of the driving force. For square integrable body forces the high Reynolds number (low viscosity) upper bound on the dissipation is independent of the viscosity, consistent with the existence of a conventional turbulent energy cascade. On the other hand when the body force is not square integrable, i.e., when the Fourier spectrum of the force decays sufficiently slowly at high wavenumbers, there is significant direct driving at a broad range of spatial scales. Then the upper limit for the dissipation rate may diverge at high Reynolds numbers, consistent with recent experimental and computational studies of "fractal-forced" turbulence.

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