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Energy dynamics in turbulence generated through concentrated regions of intense kinetic energy[1] AGUSTIN MAQUI, DIEGO DONZIS, Texas A&M University — The photo-dissociation of molecules produced by lasers has the capability of ejecting fragments with extremely high velocities, thus creating concentrated regions of very large momentum. It is of fundamental as well as practical interest to determine whether this concentrated momentum is sufficient to generate realistic turbulence. Incompressible direct numerical simulations (DNS) with concentrated sources along "lines" are used to represent the photo-dissociation of molecules. The numerical challenges associated with the implementation of strong gradients are presented in a detailed convergence study. A thorough analysis is performed on the different terms of acceleration that determine the evolution of the flow. Our results indicate that pressure and the convective acceleration redistribute most of the momentum both radially and among the components of acceleration. Radial statistics of the different components of velocity, gradients, and accelerations are also related to the time development of the flow and correlated with the eventual emergence of fully developed turbulence. Further results and consequences for particular cases realizable in laboratories will be discussed.

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