Abstract Submitted
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The self-preservation of dissipation elements in homogeneous isotropic decaying turbulence[1] MICHAEL GAUDING, LUMINITA DANAILA, EMILIEN VAREA, CORIA — The concept of self-preservation has played an important role in shaping the understanding of turbulent flows. The assumption of complete self-preservation imposes certain constrains on the dynamics of the flow, allowing to express statistics by choosing an appropriate unique length scale. Another approach in turbulence research is to study the dynamics of geometrical objects, like dissipation elements (DE). DE appear as coherent space-filling structures in turbulent scalar fields and can be parameterized by the linear length between their ending points. This distance is a natural length scale that provides information about the local structure of turbulence. In this work, the evolution of DE in decaying turbulence is investigated from a self-preservation perspective. The analysis is based on data obtained from direct numerical simulations (DNS). The temporal evolution of DE is governed by a complex process, involving cutting and reconnection events, which change the number and consequently also the length of DE. An analysis of the evolution equation for the probability density function of the length of DE is carried out and leads to specific constraints for the self-preservation of DE, which are justified from DNS.

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Michael Gauding
CORIA

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