Lyapunov exponents of inertial particles in isotropic turbulence
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TURBULENCE TEAM — The Lyapunov exponents of inertial particles in isotropic
turbulence are calculated using direct numerical simulation (DNS), filtered DNS and
large-eddy simulation (LES). Here, filter operators are taken as Eulerian space filter
and Lagrangian time filter. The Lyapunov exponents obtained are qualitatively
consistent but their magnitudes are different: the Lyapunov exponents from DNS
are largest and the ones from LES are smallest while the ones from filter DNS are
in between. The comparisons imply that the filters could reduce both stretching
and compression in turbulent flows. Furthermore, the Lagrangian time filter allows
the filtered trajectories to share the similar statistics of true particle trajectories in
turbulent flows.

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