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A variational method for the identification of nonlinear energy transfers responsible for intermittent fluctuations in turbulent shear flows
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— It is believed that the intermittent fluctuations in turbulent shear flows are triggered by the energy transfer to the mean flow via nonlinear inertial interactions. However, because of the vast range of active spatial and temporal scales, identifying the responsible interactions is not straightforward. We show that the responsible modes can be formulated as the (initially unknown) solutions of an appropriate constrained variational problem. The variational problem can be solved at a low computational cost, and the solution is the nontrivial mode with instantaneously maximal transfer of energy to the mean flow. We demonstrate the application of this variational method on a direct numerical simulation of a shear flow with external body forcing.

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