

An analytic approach to turbulence

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Abstract

An analytic approach to fluid turbulence is presented. By using well-established results and ideas in dynamical systems theory, an estimate can be derived for the number of degrees of freedom of a fluid system. Equating this estimate with the number of dynamically active modes within the system's inertial range yields a number of interesting results, which have been predicted on the basis of Kolmogorov's theory. Furthermore, a way to quantify the degree of nonlinearities of a fluid system naturally emerges from the present method. Results for surface quasi-geostrophic, 2D, and 3D Navier—Stokes turbulence are presented as examples.

REFERENCES

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