

Cascade of Random Rotation and Scaling in a Shell Model Intermittent Turbulence

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Abstract: The time behaviors of intermittent turbulence in Gledzer-Ohkitani-Yamada model are investigated. Two kinds of orbits of each shell which is in the inertial range are discussed by portrait analysis in phase space. We find intermittent orbit parts wandering randomly and the directions of unstable quasi-periodic orbit parts of different shells form rotational, reversal and locked cascade of period three with shell number. We calculate the critical scaling of intermittent turbulence and the extended self-similarity of the two parts of orbit and point out that nonlinear scaling in inertial-range is decided by intermittent orbit parts.

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Key words: intermittent orbit, unstable quasi-periodic orbit, critical scaling, extended self-similarity (ESS)

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