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# Renormalization group analysis of strongly anisotropic self-organized critical system subjected to isotropic turbulent flow

*Friday 2 October 2020 14:00 (25 minutes)*

A self-organized critical system under influence of turbulent motion of the environment is studied. The system is described by the anisotropic continuous stochastic equation proposed by Hwa and Kardar [{\it Phys. Rev. Lett.} {\bf 62}: 1813 (1989)]. The motion of the environment is modelled by the isotropic Kazantsev–Kraichnan "rapid-change" ensemble for an incompressible fluid: it is Gaussian with vanishing correlation time and the pair correlation function of the form $\propto \delta(t-t')/k^{d+\xi}$, where $k$ is the wave number and $\xi$ is an arbitrary exponent with the most realistic values $\xi = 4/3$ (Kolmogorov turbulence) and $\xi \to 2$ (Batchelor's limit). Using the field-theoretic renormalization group, we find infrared attractive fixed points of the renormalization group equation associated with universality classes, i.e., with regimes of critical behavior. The most realistic values of the spatial dimension $d = 2$ and the exponent $\xi = 4/3$ correspond to the universality class of pure turbulent advection where the nonlinearity of the Hwa–Kardar (HK) equation is irrelevant. Nevertheless, the universality class where both the (anisotropic) nonlinearity of the HK equation and the (isotropic) advecting velocity field are relevant also exists for some values of the parameters $\varepsilon = 4 - d$ and $\xi$. Depending on what terms (anisotropic, isotropic, or both) are relevant in specific universality class, different types of scaling behavior (ordinary one or generalized) are established.

## Is this abstract from experiment?

No

## Internet talk

Yes

## Name of experiment and experimental site

## Is the speaker for that presentation defined?

Yes

## Details

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