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ANOMALOUS KINETICS OF MULTI-SPECIES REACTION-DIFFUSION SYSTEM: EFFECT OF THERMAL FLUCTUATIONS

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Diffusion-limited reactions are famous examples of nonlinear statistical systems and can be observed in various chemical, biological and physical problems. For these systems in low space dimensions, the usual description by means of kinetic rate equations is not sufficient and the effect of density fluctuations has to be taken into an account. Using perturbative renormalization group we study a specific multi-species reaction-diffusion system with reactions $A + A \rightarrow (\emptyset, A)$, $A + B \rightarrow A$ at and below its critical dimension $d_c = 2$. In particular, we investigate the effect of thermal fluctuations on reaction kinetics. These are generated by means of a random velocity field modelled by a stochastic Navier-Stokes equations. The analysis is performed by means of field-theoretic renormalization group and explicit calculations are restricted to the one-loop order in the perturbation theory.

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