

Abstract Submitted
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Extinction Rate Fragility in Population Dynamics MICHAEL KHASIN, MARK DYKMAN, Michigan State University — We study population extinction due to fluctuations in a system of coupled populations and find the logarithm Q of the extinction rate. The formulation turns out to be substantially different from that for the seemingly similar and extensively studied problem of the rate of interstate switching in nonequilibrium systems. This difference quite generally leads to the extinction rate fragility, where a very small perturbation can change the extinction rate exponentially strongly [1]. Formally, it means that the limit of Q for the perturbation going to zero differs from the value of Q calculated in the absence of the perturbation. The fragility is related to the discontinuity of the quasistationary extinction current. A general condition for the onset of fragility is derived. We show that one of the best-known models of epidemiology, the susceptible-infectious-susceptible model, is fragile to total population fluctuations. The analysis [1] is extended to incorporate external noise. The analytical results are fully confirmed by simulations.[1] M. Khasin and M. I. Dykman, Phys. Rev. Lett. 103 , 068101 (2009)

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