Title:	Explosive death in complex network
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Abstract:	We report the emergence of an explosive death transition in a network of identical oscillators interacting to other oscillators through nonlocal coupling in the presence of a common environment. This transition has an abrupt and irreversible characteristic in parameter space which has been a common signature of first order phase transition. For the similar coupling scheme, both ensemble of chaotic and periodic oscillators showed qualitatively similar kind of transition, hence making it a universal transition. The details of which along with dependence of environmental and nonlocal coupling on this first-order like phase transition is also discussed. Generally, a dynamical system interact directly or indirectly with other systems as isolated systems are rare. The nature of the interaction between dynamical systems exhibits the different emergent dynamical phenomena including synchronization and suppression of oscillation. Recently, explosive death phenomena have attracted much attention of researchers since the discovery of an explosive synchronization. Here, we consider the case of both direct and indirect interaction, where oscillators interact to each other directly through nonlocal coupling as well as indirectly through a common environment. The dynamics of coupled systems with such a type of interaction is studied from phase transition point of view. We show that the transition from the oscillatory state to the death state can be first order with hysteresis in these type of complex networks. In this first order transition, two mixed states (oscillatory state and steady state) are found to coexist over a range of coupling. This type of coexistence has been found in many physical, chemical, and biological systems.
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