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Webinar
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Controlled synchronization in complex networks of dynamical systems applied to a panic model

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Abstract

The Panic–Control–Reflex system (PCR system) is a mathematical model established in collaboration with geographers and psychologists, so as to better understand and control behavioral reactions of individuals facing a catastrophic event of natural or industrial origin. This mathematical model is determined by a system of reaction–diffusion equations. In this talk, we show how to construct a complex network of non–identical instances of the PCR system. We investigate sufficient conditions on the topology of the network and on the parameters of the system, which favor the extinction of the panic behavior. We prove that the complex network generates an infinite dimensional dynamical system, whose asymptotic behavior can be described by a family of exponential attractors. Upper bounds of the fractal dimension of those exponential attractors are obtained, with respect to the coupling strength of the network. In parallel, we show how to reach a synchronization state so as to control the propagation of the panic behavior. Numerical simulations are performed in order to illustrate the theoretical results.

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