Complexity

Special Issue on

# Advances on the Resilience of Complex Networks

CALL FOR PAPERS

A common property of many complex systems is resilience, that is, the ability of the system to react to perturbations, internal failures, and environmental events by absorbing the disturbance and/or rebuilding to maintain its functions. Resilience deals with the flexibility of responses to stress and the capacity of the complex system for learning, self-organization, and adaptation at multiple scales.

Understanding how complex systems demonstrate resilience has become imperative in many different fields, such as economics, management, engineering, and ecology. Cases of collapses and crises caused by low resilience are in fact more and more frequent and encompass transportation, financial, energy, communication, and ecological systems.

This calls for a universal theory identifying drivers, dimensions, and measures of complex system resilience, which is still lacking. In particular, it is fundamental to investigate the properties of the complex systems that relate to resilience, such as learning, self-organization, adaptation, and emergence, by using dynamic approaches. They in fact permit to model complex system behaviors reproducing the internal dynamics of the entire system from the bottom, focusing on its microattributes such as the agents, their attributes, actions, goals, and the network structure connecting them. In particular, the model of the network structure deserves specific attention, because the interconnectedness among the agents triggers cascading effects with unpredictable and dramatic consequences on the system performance. In this regard, methodologies based on agent-based modeling, neural networks, system dynamics, evolutionary game theory, and percolation theory are very suitable.

This special issue aims at collecting original and high-quality studies contributing to address the issues above. Papers studying resilience of supply chains, innovation networks, financial networks, power grid systems, transportation infrastructures, communication networks, and ecosystems are welcome. We also invite papers proposing theoretical frameworks conceptualizing resilience of complex systems and reviewing the state of art of resilience embracing different contexts (economics, management, ecology, and engineering), to identify common trends as well as peculiarities.

Potential topics include but are not limited to the following:

- Dynamic models of network resilience (neural networks, chaos theory, evolutionary games, and percolation models)
- Models for cascading failures in transportation infrastructures, energy power systems, communication networks, financial systems
- Measures of network resilience to partial and total disruptions
- Agent-based models of networks dynamics determining resilience to disruptions
- State-of-art reviews comparing resilience studies in different fields and concerning diverse types of complex systems
- Supply Chain Resilience frameworks, including antecedents and effects on performance
- Power Grid Resilience
- Relationship between resilience and features of complex systems (e.g., self-organization, adaption, learning, and emergence)
- Relationship between resilience and sustainability of ecosystems

Authors can submit their manuscripts through the Manuscript Tracking System at https://mts.hindawi.com/submit/journals/complexity/drnm/.

Papers are published upon acceptance, regardless of the Special Issue publication date.

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