Editorial

The origin of this special issue took place at the 9th European Nonlinear Dynamics Conference (ENOC 2017) in Budapest, Hungary. Specifically, the mini-symposium on Random Dynamical Systems – Recent Advances and New Directions brought together novel perspectives on analyzing stochastic dynamics with applications including biology, structural dynamics, control, energy and mechanics. The expanded use of stochasticity in more realistic models exposes questions related to bifurcations, meta-stability, tipping and early warning signals, multiscale dynamics, and connections between chaos and stochastic dynamics. The observed phenomena in applications drive new methodologies and analyses, needed to understand the interplay between different sources of stochastic effects and nonlinearities, network structure, multi-mode and multi-scale behavior, non-smooth dynamics, energy transfer, and spatio-temporal phenomena. Of course, a single issue cannot hope to cover all of the new topics in stochastic analysis for applications. Nevertheless, we hope that the collection of applications and stochastic models presented in this issue illustrates some of the exciting advances and perspectives relevant for broad classes of stochastic models and demonstrates the need in advancing the theory of stochastic processes.

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