Partial Differential Equations in Ecology: Recent Advances and New Challenges

Guest Editor:

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Message from the Guest Editor

The application of partial differential equations (PDEs) in ecology has an 80-year long history, dating back to seminal works by Fisher (1937) and Kolmogorov et al. (1937) where nonlinear population waves were discovered and studied. A few decades later, Alan Turing's (1953) discovery of diffusive instability was applied to ecological pattern formation, which led to an upsurge of research on all aspects of the population dynamics in space and time using PDEs of diffusion-reaction type. Today, at appropriate spatial and temporal scales, PDEs remain a powerful modeling tool widely used to shed new light on some old problems and provide insights into new ones. This Special Issue will highlight recent advances in the application of PDE-based models in ecology and population dynamics. We welcome papers where traditional diffusion-reaction models are applied to problems of ecological significance. We especially welcome papers where the PDE framework is extended beyond the standard diffusion-reaction paradigm, e.g., to include cross-diffusion, nonlocal effects, time-delay, etc. Both analytical studies and simulation-based studies will be considered.

Special Issue

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Message from the Editor-in-Chief

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