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Existence of Invariant Measures for Delay Equations with (Stochastic) Negative Feedback

In this talk, I will present our recent work (https://arxiv.org/abs/2501.00141) on the existence of invariant probability measures for delay equations with negative feedback, both with and without noise. We support these theoretical results with numerical studies. Applications include Wright's equation, Nicholson's blowflies equation, and the Mackey-Glass equations. While additive noise typically destroys the dynamical properties of the underlying system, our aim is to study a class of stochastic perturbations that preserve some of these properties in negative feedback systems. Throughout the talk, we use the Mackey-Glass equations to illustrate our main results and highlight the specific analytical challenges involved. This is joint work with Onno van Gaans and Sjoerd Verduyn Lunel.