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Stabilization of cycles with impulse stochastic control

We consider models of population dynamics and stabilize a prescribed cycle or an equilibrium of the difference equation using impulse stochastic control. Our technique, inspired by the Kolmogorov's Law of Large Numbers, activates a stabilizing effect of stochastic perturbation and allows for stabilization using a much wider range for the control parameter than would be possible in the absence of noise. Our main general result applies to both Prediction-Based and Target-Oriented Controls. This analysis is the first to make use of the stabilizing effects of noise for Prediction-Based Control; the stochastic version has been examined in the literature, but only the destabilizing effect of noise was demonstrated. A stochastic variant of Target-Oriented Control has never been considered, to the best of our knowledge, and we propose a specific form that uses a point equilibrium or one point on a cycle as a target. We demonstrate our results numerically on the logistic, Ricker and Maynard Smith models. This is joint work with C. Kelly (University College Cork) and A. Rodkina (University of the West Indies).