Nonlinear dynamical systems and chaos: extreme multistability

Coupled dynamical systems can exhibit an unusual kind of multistability (extreme multistability) involving the coexistence of infinitely many attractors for a given set of parameters. Extreme multistability is associated with generalized synchronization and the emergence of a conserved quantity whose value leads to a "slicing" of the state space into manifolds. These "slices" grow as time approaches infinity and there exists at least one attractor in each of them. I explored the dependence of this phenomenon on the coupling and on a mismatch of parameters of the coupled systems. The coupling yields a class of dynamical systems that manifest characteristics of dissipative and conservative systems.

I am interested in exploring the possibility and ecological significance/implications of extreme multistability in ecological systems.