Applied Mathematics Seminar

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Border-collision bifurcations in a driven time-delay system

We show that a simple piecewise-linear system with time delay and periodic forcing gives rise to a rich bifurcation structure of torus bifurcations and Arnold tongues, as well as multistability across a significant portion of the parameter space. The simplicity of our model enables us to study the dynamical features analytically. Specifically, these features are explained in terms of border-collision bifurcations of an associated Poincaré map. Given that time delay and periodic forcing are common ingredients in mathematical models, this analysis provides widely applicable insight.

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