

Border-collisions in a periodically forced self-oscillatory piecewise smooth system with a high number of switching manifolds

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Abstract: We report a number of new dynamic phenomena arising in a piecewise smooth system, whose motion involves two oscillatory components: a low frequency periodic external force and high frequency self-oscillations. Ultimately, this system can be modeled by a map with an extremely high number of switching manifolds. It is well-known that when a self-oscillatory system is subjected to an external periodic forcing, the total motion can be seen as occurring on a closed invariant curve and, in the absence of resonances (synchronization or entrainment), the motion is said to be quasiperiodic. The problem that we are interested in is associated with the role that border-collision bifurcations play in synchronization of the two modes and in transitions to chaos.

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