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The dynamics of a hybrid chaotic system

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Abstract Piecewise linear dynamics may be used to study several mechanical systems. Moreover, the piecewise linear systems, on one hand have explicit solutions, since it involves linear differential equations, on the other hand can be used to study chaotic nonlinear systems, through the methods we will explain. In this talk, we consider a forced damped piecewise linear oscillator whose motion is modeled by a second-order non-autonomous differential equation. Therefore, our hybrid chaotic system has a continuous regime, where the time flow is characterized by the explicit solutions of the ordinary differential equations, and a singular regime, where the time flow is characterized by an appropriate transformation linking the explicit solutions from one domain to the other. We will analyse the dependence on initial conditions, parameter variation and the occurrence of global strange attractors. We also intend to investigate, making use of numerical simulations, where are the regions where occurs periodic and chaotic motion and the existence of regions where the model explodes.

Keywords: Dynamical systems, Symbolic dynamics, Iteration theory, Transition matrices, Attractors.

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