

Bifurcation and Chaos in a Nonlinear Dynamical System

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The complex dynamics is explored in a nonlinear dynamical system. The existence of periodic solutions via different types of bifurcation with respect to control parameter are established. Direction and stability of periodic solutions are also determined using normal form theory and center manifold argument. To substantiate analytical findings, numerical simulations are performed. The system shows rich dynamic behavior including chaos and limit cycles.