Contributed Talk

Dynamics and Mitigation of Extreme Events in Nonlinear Oscillatory Systems

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Extreme events, rare phenomena with significant societal and environmental impacts, arise in diverse fields such as oceanography, biology, and economics. This talk explores the dynamics and mitigation of extreme events within nonlinear oscillatory systems, focusing on rare, large-amplitude oscillations in models like the Rayleigh-Lienard hybrid and Mathews-Lakshmanan oscillators. By employing fast-slow dynamical frameworks, bifurcation routes and mechanisms underlying these events are revealed. Practical mitigation strategies are also presented, highlighting the role of linear damping in suppressing extreme events in periodically forced anharmonic and asymmetric Lienard oscillators. This study provides critical insights into understanding, predicting, and controlling extreme events, offering pathways for interdisciplinary applications in resilient system design.