

Public Abstract

First Name:Kenneth

Middle Name:Ray

Last Name:Felts II

Adviser's First Name:Carmen

Adviser's Last Name:Chicone

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term:SP 2009

Department:Mathematics

Degree:PhD

Title:Oscillators: Resonances and Excitations

This thesis is a compilation of work done in the field of oscillators. One topic is an investigation into impact oscillators and their properties. The second topic is concerned with excitation of oscillators. The thesis begins with mathematical preliminaries; this chapter will explain Hertzian contact and Melnikov theory. The next chapter investigates a mathematical model utilizing Hertzian contact to predict the behavior of a steel pendulum bob striking an aluminum alloy barrier. The model is shown to capture the qualitative and quantitative behavior of the impact oscillator and demonstrates a new qualitative effect: Existence of a non-monotone period function. The following chapter will prove the existence of a non-monotone period function for more general impact oscillators. The final chapter is devoted to excitation of energy in periodic or nearly periodic classical Hamiltonian systems.