MECHANICAL ENGINEERING STUDENT SEMINAR

Thursday, December 15, 2022, at 13:00.
Online: https://technion.zoom.us/j/92731359218

Escape of two-DOF dynamical system

from the potential well

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Many common and widely explored phenomena, such as dynamics of molecules and absorbed particles in chemistry, or celestial mechanics and gravitational collapse in physics, exemplify the escape from a potential well. This fundamental problem served as the foundation for a variety of engineering issues and applications, including energy harvesting, phenomena in Josephson junctions, capsizing of ships, and dynamic pull-in in microelectromechanical systems (MEMS).

In this work, the escape of an initially excited dynamical system with two degrees of freedom from a potential well is considered. For a better understanding of the phenomena, two general 2DOF models were investigated. The first model comprises two identical particles coupled by a linear spring, in three benchmark potential wells with different topologies. The second model considers the escape of a particle from 2DOF potential well. In this section, we try to describe the escape for the family of potential shapes between two integrable cases.

Since the systems under consideration are non-integrable, one can expect complex dynamic behaviors. However, by wide numerical investigation, we were able to describe the escape dynamics in terms of simplified tractable models and to overcome the main challenge - to reveal the basic mechanisms that govern the escape in different regions of the parametric space and to construct appropriate asymptotic approximations for the analytic treatment of these mechanisms.

Note: the seminar will be given in Hebrew

Seminars Coordinator: Assoc. Prof. Matthew Suss.