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ABSTRACT

The objective of this thesis, which consists of four chapters is to study some problems in non-linear oscillations, which governed by one or coupled set of second order non-linear differential equations.

The study in the first two chapters is focused on:

- Finding the approximate solutions in the presence of internal resonances conditions using the perturbation method.
- Determination of the steady state solutions (periodic solutions).
- Obtaining the frequency response equations.
- Examining the stability of the steady state solutions, by applying the variational method.
- Determining the sort of the stability by using Routh –Hurwitz Criterion.
- Graphical presentation of the results and its discussion.
- Finding numerical simulations of the equations and its discussion.

In the second two chapters, the study is devoted to the construction of analytic expression to the solution up to the third approximation

- Finding numerical simulations of the equations and its discussion.

The first chapter is devoted to the system having one-degree-of- freedom with quadratic, cubic and quartic non-linearities to the sum of external excitation and multi–excitation frequency.

The second chapter is concerned with principal parametric resonance of two-degree-of freedom system with quadratic and cubic non-linearities in the presence of two to – one internal resonance.

The third chapter is devoted to the response of two-degree-of- freedom with quadratic non-linearities to multi- frequency excitations.

The fourth chapter is concerned with the response of three-degree-of-freedom system with quadratic and cubic non-linearities to multi- frequency excitations.