

Nonlinear harmonic vibration analysis of a plate-cavity

Write up of the 1-minute presentation | S Tarun Prasad | ME17B114

The paper studies the nonlinear harmonic vibration of a configuration of a cuboidal enclosure over an elastic plate as shown in the fig. 1.

An external acoustic vibration is applied to the elastic plate. The authors present the first-ever take on modelling a plate-cavity system analytically and solving it. The plate deflection is modelled using Von Karman theory which is a set of

nonlinear PDE's describing large oscillations of thin plates. From this coupled nonlinear differential equations are analytically derived using Galerkin's method. Multiple scale's method is then employed to study the frequency- amplitude relationships under different resonance conditions and the effect of different parameters on the frequency response is studied. I find it interesting because the paper studies effect on parameters for different combinational resonance conditions of various modes of oscillations besides primary and secondary resonance conditions. This leads to a more comprehensive set of conclusions.

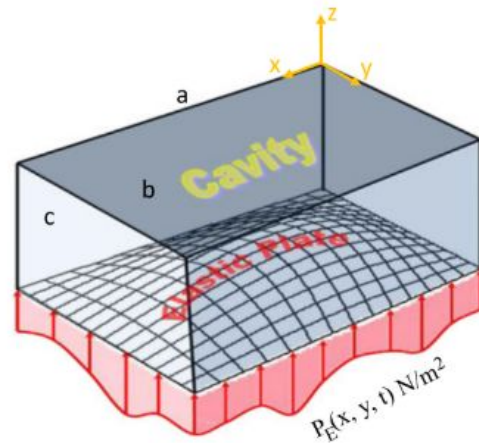


Fig. 1 Schematic configuration of a plate and an air cavity