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VIBRATION ANALYSIS OF A CANTILEVERED BEAM WITH PIEZO-ELECTRIC ACTUATOR AT THE TIP AS A CONTROLLABLE ELASTIC STRUCTURE

Abstract

This research is carried out to develop a baseline approach to solve the problem of a hinged Euler-Bernoulli beam with piezo-electric actuator attached at the tip, which can be utilized in solving more complex problems in engineering and in the selection and utilization of commercial software. An in-house computational routine is developed for various applications. For comparative study, related beam and plate problems are solved, which could be used in further works for feasible applications. Widely accepted beam and plate theories are considered for comparative study. Euler-Bernoulli theory is utilized to solve the free vibration of the beam by both analytical and numerical methods. The equation of motion of the beam is obtained by using Hamilton's principle. Finite element method is utilized to write in-house program for the free vibration of the beam. Preceding work addressed for a hinged Euler-Bernoulli beam with a spring attached at the tip has given encouraging results.