Vibration of the cantilever beam using a piezoelectric actuator

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ABSTRACT

This paper deals with experimental and finite element analysis of vibration of the aluminum beam excited by a piezoelectric thin film actuator. One beam's end was fix supported and vibration of the beam's free end was measured using laser displacement sensor.

The beam's eigenfrequency and damping ration for the first bending vibration mode was determined experimentally. The beam's deflection when the beam was excited by piezoelectric actuator was also determined experimentally. The actuator was controlled by a signal generator and piezo driver module for driving piezoelectric actuators.

Finite element model of the beam with piezoelectric actuator was created and three types of analyses were performed: modal, transient and harmonic. Results from finite element analyses were compared with data from experimental measurements.

The experimental devices as well as the finite element model will be used in the future for analyses of the actuator as an active damping element and in the study of its energy harvesting capability.

ACKNOWLEDGEMENT

This work was supported by the Slovak Grant Agency: VEGA 1/0081/18, VEGA 1/0416/21, KEGA 011STU-4/2020 and APVV-19-0406.