

Modal Analysis of Microcantilever Response to Sine Wave Excitation Using Vibrational Speaker

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Abstract

The dynamic response of microcantilever which is simple Micro Electro Mechanical Systems (MEMS) structure, to sine wave excitation is studied using the vibrational speaker set up in atmospheric pressure. Microcantilever is machined in micro wire cut EDM process. Mostly Silicon material is used for microsystems based structures. Here Aluminium, Copper and stainless steel materials were machined for fabricating the microcantilevers. Mode shapes and corresponding displacements have been formulated in experimental analysis. These Eigen frequency, displacement and mode shape values have been compared with the results of numerical simulation values using COMSOL Multiphysics® software. Also, the microcantilever sensitivity is enhanced with the design of various geometries.

Reference

1. Don W. Dareing, Modal analysis of microcantilever sensors with environmental damping, J. Appl. Phys. 97, 084902 (2005)
2. Mohd. Zahid Ansari, Comparison between Deflection and Vibration Characteristics of Rectangular and Trapezoidal profile Microcantilevers, Sensors (Basel). 2009; 9(4): 2706–2718, (2009)

Figures used in the abstract

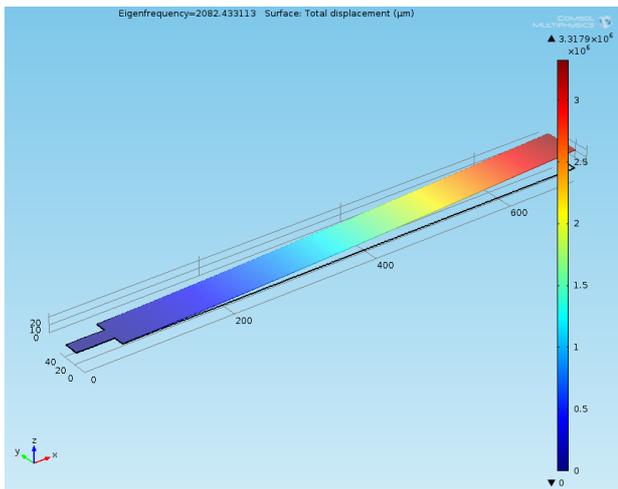


Figure 1: Microcantilever Mode Shape for Profile 1.

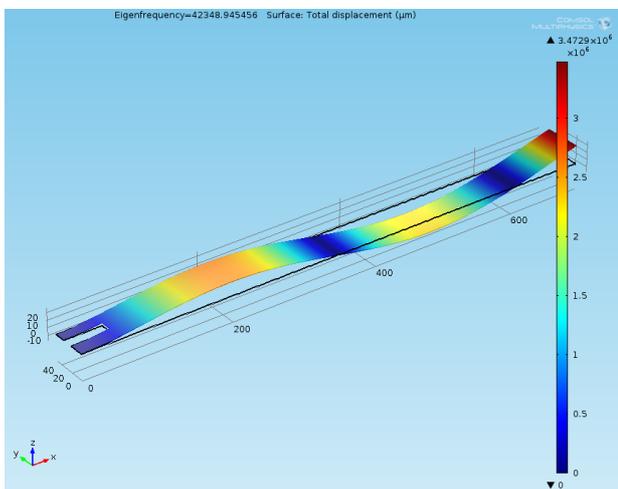


Figure 2: Microcantilever Mode Shape for Profile 2.

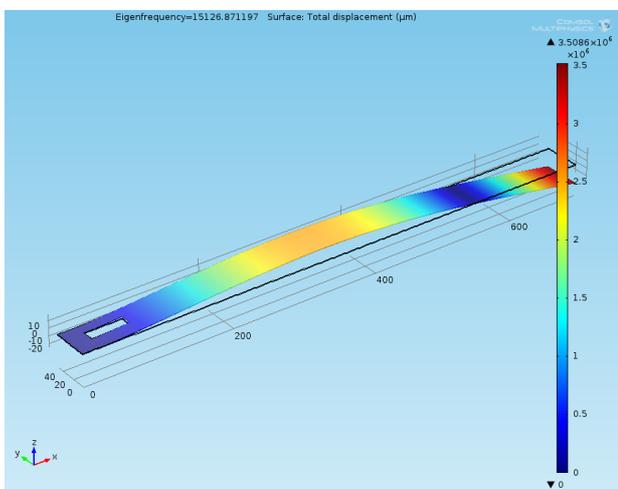


Figure 3: Microcantilever Mode Shape for Profile 3.

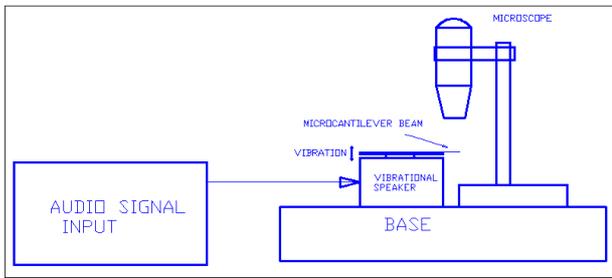


Figure 4: Experimental Set up.