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Vibrational Modes of MEMS based Directional Sound Sensor TIMOTHY SHIVOK, BYUNGKI KIM, JOSE SINIBALDI, GAMANI KARUNASIRI, Naval Postgraduate School — A directional sound sensor was fabricated using micro-electromechanical system (MEMS) technology based on the operational principle of Ormia ochracea fly's hearing organism [1]. The fly uses coupled bars hinged at the center to achieve the directional sound sensing by monitoring the difference in vibration amplitude between them. The MEMS design employed in this work consisted of a 1x2 square millimeter polysilicon membrane hinged at the center. The membrane was positioned about 2 micrometers above the substrate by using a sacrificial silicon dioxide layer. The membrane has two primary vibrational modes (rocking and bending) which were analysis by finite element analysis and found to be at 2.5 kHz and 8 kHz. The incident sound wave causes the two sides of the membrane to oscillates with slightly different amplitudes due to the arrival time difference. In this abstract, the vibrational modes of the system measured using electrical and sound sources will be presented. The experimental data were found to be in good agreement with the modeling. [1] R.N. Miles, et. al.: "Mechanically coupled ears for directional hearing in the parasitoid fly Ormia ochracea," J. Acoust. Soc. Am., **98**, 3059, (1995).

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