Design and Simulation of MEMS Based Gyroscope for Vestibular Prosthesis

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Abstract

The primary function of the vestibular system is to provide the brain with information about the body's motion and orientation. The absence of this information causes blurred vision and spatial disorientation, vertigo, dizziness, imbalance, nausea, vomiting, and other symptoms often characterize dysfunction of the vestibular system. Our aim is to design vestibular prosthesis using COMSOL Multiphysics 4.2a. In this model there are two modes driving mode and sensing mode. The driving force is given in the x-direction and the displacement due to the Coriolis effect is sensed in the y-direction. In the prosthesis, the three semicircular canals are replaced by 3-axis MEMS gyroscopes. The microscopic gyroscope senses angular motion of the head and generates voltages proportional to the corresponding angular accelerations. Then, voltages are converted into electric current pulse relating angular acceleration to spike count in vestibular nerve.

Reference

Andrei M. Shkel et al., "Feasibility Study on a Prototype of Vestibular Implant Using MEMS Gyroscopes",IEEE,Pg no 1526-1531 (2002)

Figures used in the abstract

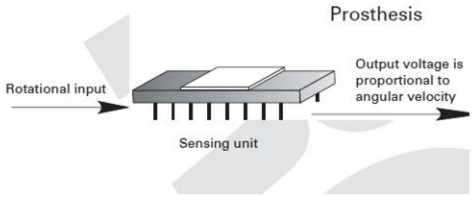

Figure 1: MEMS gyroscope.

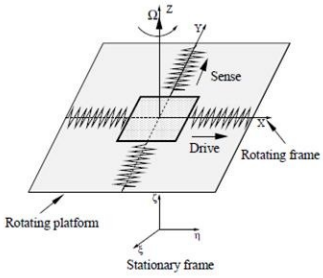

Figure 2: Gyroscope.