

ANSYS SIMULATION STUDY OF MEMS TUNING FORK GYROSCOPE

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ABSTRACT

Nowadays, MEMS based gyroscope had play importance role in today's sensor device due to the sensitivity and its size. This paper presents a MEMS based Tuning Fork Gyroscope (TFG) design by using ANSYS software. The designing of the Tuning Fork Gyroscope is based on the architecture and the parameter that been chosen from the previous studies. The structure of TFG is focus on the capacitance at the comb's structure and the chosen parameter are based on which factor that makes greater effect on the sensing when it is variance and the parameter is using Taguchi method to determine the mathematical formulation of the design of experiments. From the simulation results, it can be conclude that the best design of Tuning Fork Gyroscope based on capacitance which had the values of 260 μm for comb finger length, 30 μm for comb finger width, 80 μm comb finger thickness and lastly capacitance gap of 3 μm .

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

MEMS Tuning Fork Gyroscope is very good sensor for detecting the direction of momentum and are widely use in navigation system. Although it comes in small size, but it can produce a fantastic performance and precision. The study of this device simulation will give good experience and people can gain a lot of knowledge from it.

In this chapter, the background of study, problem statement , objective, scope of project, and organization of project have been described as the introduction to this project.

1.1 BACKGROUND OF STUDY

Gyroscope is defined as an angular velocity sensor, working on the basic principle of conservation of momentum. Momentum is, conceptually, the tendency of a body to continue moving in its direction of motion, which is a natural consequence of Newton's First Law [1]. Micro Electro Mechanical System or MEMS in other hand is a technology that used both electronic and mechanical in micro size. MEMS are made up of component in between 1 to 1000 micrometer in size and generally the device's size is in the range from several micrometers to several millimeters. MEMS based