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# A simple analysis to improve linearity of touch mode capacitive pressure sensor by modifying shape of fixed electrode

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## Highlights

- “A simple analysis to improve linearity of touch mode capacitive pressure sensor by modifying shape of fixed electrode”
- By Myong-Chol Kang, Chang-Sik Rim, Yong-Taek Pak
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- Simple analytical analysis is presented for the deflection of square diaphragm.
- A formula was derived to modify the shape of fixed electrode.
- The linearity of sensor is improved in touch operating range.
- The linear region is increased, but sensitivity of sensor is decreased.

## Abstract

In this paper, we simply analyze the change of touched area between the square diaphragm and the fixed bottom electrode of the touch mode capacitive pressure sensor. The virtual radius model of the circular diaphragm is utilized for the analytical analysis. A formula is derived to modify the fixed electrode shape for improvement of linearity based on the analysis. Finite element analysis (FEA) is used for simulation by software ANSYS and the accuracy of the analytical analysis is investigated. Simulation results of the proposed model shows good agreement to the analytical analysis. In the model with modified electrode, the linearity is more improved than the typical one, while sensitivity is decreased. The analysis results suggest that the analytical model can be used to design fixed bottom electrode of touch mode sensor.

**Keywords;** touch mode, capacitive pressure sensor, linearity, square diaphragm

## Introduction

Capacitive pressure sensors are widely used for different kinds of applications owing to high sensitivity, low turn-on temperature drift, low power consumption and robust structure. Their characteristics and stability are improved thanks to the development of Micro-electromechanical systems (MEMS) technique.

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