

Numerical Assessment of Simplified Formulas for Electrostatic Simulation and Design of Micro-Electro-Mechanical Systems (MEMS)

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Abstract

The design procedures of micro-electro-mechanical systems (MEMS) can be strongly dependent on the accurate evaluation of global quantities related to the electrostatic fields. In particular, the capacitance and the electrostatic force play often an important role in the design of micro-machines. In order to accelerate the design process, it is customary to adopt simplified formulas which have been proposed for simple geometries. Nevertheless, in many cases it is necessary to improve the accuracy of computations. The main purpose of this paper is to provide some new investigations on the numerical evaluations of electrostatic quantities by means of the Finite Element Method (FEM), presenting some numerical results on realistic examples and comparing them to experimental outcomes.

Keywords: Reliability, electrostatic field, Micro-electro-mechanical systems (MEMS), Finite Element Method (FEM), numerical assessment, computation accuracy.

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