Abstract

Modeling a MEMS (Micro Electro-Mechanical Systems) electrostatic actuator in electrical domain is important for system simulation of the actuator along with its associated electronics. For instance, an integrated MEMS resonator used in a serial I/O PLL design modeled in electrical domain enables to optimize the system with the rest of the electronics. In this work, we have developed a simplified equivalent circuit model for MEMS electrostatic actuator and simulated it using Natspice, a U.C. Berkeley SPICE3f5-based in-house circuit simulator. The equations governing the actuator are implemented using coupled RL and RLC circuit, defined in SPICE and Verilog-A. Natspice simulation results are presented and compared with Matlab results which show very high correlation. A system consisting of an array of MEMS devices can be quickly simulated using this simplified model.

References


Index Terms

Computer Science

Circuits and Systems

Keywords

Microactuator, Equivalent Circuit, Large Signal, Small Signal