MODELING AND SIMULATION OF SHIFT IN RESONANT FREQUENCY OF CROSS-BEAM RESONATOR

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Abstract

The objective of this work is to develop analytical Solution to obtain natural resonant frequency and shift in resonant frequency of a new microelectromechanical (MEMS) device called Cross-Beam Resonator in terms of its geometry and its material properties. The resonator is simulated in MEMS simulation CAD tool Intellisuite to validate the analytical model for natural resonant frequency obtained. Analytical equations are implemented in MATLAB and the theoretical results obtained are verified with those obtained from Intellisuite. The results of analytical simulation compare well with those of Intellisuite simulation. Advantage offered by analytical method is that it is efficient in terms computation speed and provides better understanding of the electromechanical behavior of the device. Cross-beam resonator achieves the resonant frequency in HF range at the same time has better sensitivity to voltage resulting in better tunability compared to clamped-clamped beam resonator.