

Generalized Parametric Resonance in Electrostatically Driven MEM Oscillators

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The dynamic response of a class of micro-electro-mechanical oscillators is considered for which the electrostatic excitation causes parametric excitation on both the linear and nonlinear terms in the equation of motion. This results in an effective nonlinearity (hardening versus softening) for the system which undergoes qualitative changes as the excitation amplitude varies. The governing equations are analyzed using averaging and the predicted frequency response curves are shown to compare very well against simulations and experiments.