

PROCEEDINGS

Electrothermal Regulation of Nonlinear Behaviors of Micro-Mechanical Resonators

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ABSTRACT

With the advancement of technology, micro resonators have progressively evolved toward micro- and nanoscale dimensions, resulting in dynamical behaviors that differ significantly from those of macroscopic structures. These systems exhibit stronger nonlinear responses and higher quality factors. In micro resonators, electrothermal effects are particularly prominent; temperature variations directly influence the dynamic characteristics of the device, further intensifying the complexity of nonlinear behavior and thereby affecting the stability and performance of the micro resonator. This paper proposes to actively exploit the unavoidable electrothermal effects to regulate nonlinear dynamical behaviors, thereby enhancing the performance of micro resonators. It will analyze the influence of electrothermal effects on the dynamical parameters of micro resonators, investigate the mechanisms of electrothermal regulation on nonlinear dynamics, and, in response to specific nonlinear dynamical phenomena, propose corresponding performance-enhancement and regulation strategies.

KEYWORDS

Micro mechanical resonators; electro-thermal; nonlinear behaviors

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