

Dynamic Pull-in for Micro-Electro-Mechanical Device with a Current-Carrying Conductor

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Analysis for the dynamic pull-in occurring in the micro-electro-mechanical system with a current-carrying conductor is presented.

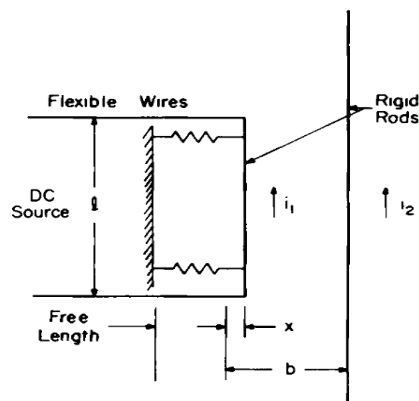


Fig. 13 MEMS with a current-carrying wire

The considered one-degree-of-freedom spring-mass model is based on the nonlinear initial value problem with a singular term describing the attraction force between the conductors due to the magnetic fields produced by the current, see Fig. 13. The pull-in threshold and pull-in time are estimated precisely in terms of model parameters. The presented analysis is supported by the results from [1] and [2]. The sufficient conditions for the existence of periodic solutions of the model equation are proved analytically and verified numerically by ODE solvers.

[1] P. Skrzypacz, S. Kadyrov, D. Nurakhmetov, D. Wei. Submitted for publication in *Nonlinear Analysis: modelling and control*

[2] D. Omarov, D. Nurakhmetov, D. Wei, P. Skrzypacz. Accepted for the publication in *Applied and computational Mechanics*

