Modal Decomposition in Goalpost Micro/nano Electro-mechanical Devices

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We have studied the three firsts symmetric out-of-plane flexural resonance modes of a goalpost silicon micro-mechanical device. The fabrication process and first flexural mode have been described in Ref. [1]. Measurements have been performed at 4.2 K in vacuum, demonstrating high Qs and good linear properties. Numerical simulations have been realized to fit the resonance frequencies and produce the mode shapes. These mode shapes are complex, since they involve distortions of two coupled orthogonal bars. Nonetheless, analytic expressions have been developed to reproduce these numerical results, with no free parameters. Owing to their generality they are extremely helpful, in particular to identify the parameters which may limit the performances of the device. The overall agreement is very good, and has been verified on our nano-mechanical version of the device.

[1] E. Collin et al. *J. of Low Temp. Phys.* **150**, p. 739 (2008).
This work is intended to be a poster and a conference paper.

Section: DV - Devices

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