

Abstract Submitted  
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**Grating Loaded Cantilevers for Displacement Measurements**<sup>1</sup> ERTUGRUL KARADEMIR, Bilkent University, Department of Physics, SELIM OLCUM, ABDULLAH ATALAR, Bilkent University, Electrical Engineering Department, ATILLA AYDINLI, Bilkent University, Department of Physics — A cantilever with a grating coupler engraved on its tip is used for measuring displacement. The coupled light in the cantilever is guided to a single mode optical waveguide defined at the base of the cantilever. The grating period is 550 nm and is fabricated on a SOI wafer using nanoimprint lithography. The waveguide and the cantilever are defined by an RIE and cantilevers released by KOH and HF solutions. Light with 1550 nm wavelength, is directed onto the grating coupler and detected at the cleaved end of the SOI waveguide. The angle of incidence is controlled by a motorized rotary stage. Light couples into the waveguide at a characteristic angle with a full width at half maximum of approximately 6.9 mrad translating into a Q factor of 87.5. The displacement sensitivity is measured by driving the cantilever with a frequency controlled piezoelectric element. The modulation of the light at the waveguide output is lock-in detected by a biased infrared detector. The resulting 43% $\mu\text{rad}^{-1}$  sensitivity can be increased with further optimization.

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Ertugrul Karademir  
Bilkent University, Department of Physics

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