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Nanoindenter Stiffness Measurements on a MEMS Sound Sensor[1] R. DOWNEY, L. BREWER, G. KARUNASIRI, Naval Postgraduate School — We demonstrate a novel technique to extract the various components of the stiffness (or compliance) measured along the surface of a MEMS directional sound sensor. Because the sensor comprises a cantilever beam mounted on torsion springs, the overall stiffness consists of various compliance components added in series. Stiffness measurements made using a nanoindenter are found to agree with an analytical model and a finite element model (FEM) of the sensor. Moreover, by exploiting the differing power-law characteristics of the individual compliance components, we demonstrate extraction of the separate components from a logarithmic plot of the overall stiffness. Finally, we measure the ultimate (failure) strength of the sensor, from which we obtain the maximum acoustic intensity the sensor can tolerate.

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