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A Novel Ambient Operating Force and Acceleration Detector MING YIN, Benedict College, SC 29204, HUAIZHOU ZHANG, MICHAEL WESCOTT, YEUNCHEOL JEONG, JAMES GAMBREL, TIMIR DATTA, Univ of South Carolina, SC 29208 — An investigation to develop a novel accelerometer capable of operating under ambient conditions without any cryogenics is in progress in our laboratory. In this device the proof mass comprises of magnetic or diamagnetic materials. This mass is freely suspended in stable equilibrium under gravity by the combined actions of magnetic attraction and repulsion forces. Stability is achieved along all three Cartesian axes even at zero frequency. For highly dynamical onboard platforms, realtime nulling by active control at high-frequency is desirable. A description of prototypes and measurements will be discussed. Sensitivity in the $\sim$ 0.1ngal regime to both kinematic and gravitational accelerations and $\sim$ pN force resolution is observed. Our initial results including (i) detection of tidal changes in the gravitational background, (ii) seismic tremors, (iii) Fourier analysis of time displacement data and (iv) design considerations for enhanced sensitivity and improved performance will be presented. Several scientific and technological implications will be suggested.

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