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Technique for Minimizing the Effect of $1/f$ Noise in Magnetic Sensors ALAN EDELSTEIN, GREG FISCHER, JAMES BURNETTE, U.S. Army Research Laboratory, SHU-FAN CHENG, Naval Research Laboratory, EDMUND NOWAK, Dept. of Physics and Astronomy, Univ. of Delaware, Newark, DE, WILLIAM EGELHOFF, NIST, Gaithersburg MD, CATHY NORDMAN, NVE, Eden Prairie MN — Sensors such as magnetic tunnel junctions with MgO barriers offer the possibility of increased sensitivity. The magnetoresistance of these junctions can be as large a 400%. Unfortunately, these magnetoresistance devices suffer from having considerable $1/f$ noise. We have a device, the MEMS flux concentrator, that modulates the field at the position of the sensor and thus increase the frequency of the field to be detected to kHz frequencies where the $1/f$ noise is much smaller. It does this by having flux concentrators on MEMS flaps that are driven to move electrostatic comb drives. The flaps on each side of the sensor are connected by springs so that the desired motion is a normal mode. The signal appears as sidebands that can be demodulated using a lock-in amplifier. The device will increase the sensitivity at 1 Hz of many sensors by a factor of 100. Tests indicate that the device does not increase the noise and that it will function at frequencies lower than 1 Hz. Results of initial tests will be reported.

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