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Nonlinearities in Magnetostrictive Transducer Dynamic Output. A.B. Flatau, L. E. Faidley, M. J. Dapino, and F.T. Calkins, Aerospace Engr. & Engr. Mechanics, Iowa State University, Ames, IA. We have designed a magnetostrictive transducer for use in characterizing material properties of 11.5 cm long by 1.27 cm diameter cylindrical samples of the magnetostrictive material Terfenol-D. The material studied is a commercially available Terfenol-D, made using a modified Brigman manufacturing process. Output displacements in the stiffness controlled portion of the transducer's dynamic range (as loaded, up to 1000 Hz) were measured using a LVDT. Trends in output were observed as controlled changes in operating conditions were made. Excitation frequency, amplitude of magnetic excitation, and prestress were varied independently as other operating conditions (including temperature, mass load, and magnetic bias) were held fixed. Data are presented demonstrating distinct nonlinearities associated with a monotonic decrease in output with increased excitation frequency, a monotonic increase in output with increased excitation amplitude, and an initial increase followed by a decrease in output with increased prestress.

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