

Abstract

Piezoelectric ultrasonic motors (PUMs) fill a unique niche in mechatronic actuators. The motors are lightweight, simple, and reliable, containing a single moving part that provides the function of motor, transmission, and brake. They are ideal for a variety of robotic applications as well as commercial and medical applications. In order to exploit PUMs fully, computationally efficient models of dynamic response, capturing all important dynamics, are needed. This paper describes the experimental characterization of the dynamic response of a typical commercial PUM (Shinsei USR-30) using an inertial load and evaluation of three classes of dynamic models: second-order predictive (physics-based) models, algebraic (curve fitting) descriptive models, and neural network approximation.

Citation

"Dynamic Response Modeling of Piezoelectric Ultrasonic Motors", Dabney, J. B., Ghorbel, F. H., and Harman, T. L., Accepted by ASME Congress, November 2005.