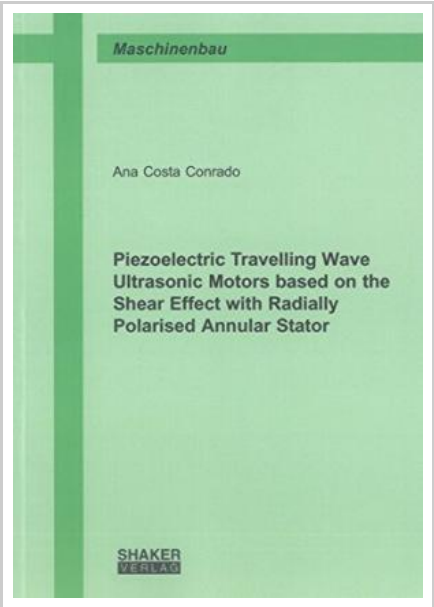


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Piezoelectric Travelling Wave Ultrasonic Motors based on the Shear Effect with Radially Polarised Annular Stator

By Ana Costa Conrado

Shaker Verlag Okt 2011, 2011. Buch. Book Condition: Neu. Neuware - The present thesis is concerned with the mathematical-analytical model of a piezoelectric travelling wave ultrasonic motor (USM) based on the shear effect. USMs have been adopted in high precision applications such as in the robotics, automotive industry, medical devices and autofocus of camera lenses. They are characterised by compact size, low speed with high torque and zero backlash. Since the shear piezoelectric coupling factor and the shear piezoelectric constant are higher than for the other piezoelectric effects, a relative higher torque and a better efficiency are also attained. In this thesis, special attention is paid to the kinematics and the geometry of the motor parts and to characteristics that influence efficiency and torque. In the motor, the stator is of disc-type, made of piezoceramics and radially polarised. It is therefore modelled as an annular Reissner-Mindlin plate with piezoelectric terms. Rayleigh-Ritz discretisation is used to obtain eigenfrequencies and eigenmodes of the stator plate. In the laboratory, measured eigenfrequencies of the free vibrations of the plate corroborate the numerical method. Particularly, the generation of travelling waves requests the excitation of two degenerated vibration modes. This requires a specific electrode configuration and,...

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