

ABSTRACTS OF OPENING AND CLOSING LECTURES

Nonlinear Frequency- and Field-Dependent Operational Non-Linearities of Soft Piezoceramics d15 Shear Response-Mode

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This plenary lecture investigates the non-resonant driving frequency- and AC electric field-dependent operational non-linearities of the thickness-shear strain piezoelectric coupling coefficient (d15) of poled soft piezoceramic rectangular patches. Therefore, after an introduction on the operational field-dependent non-linearity (FDNL) and the transverse shear actuation mechanism (SAM), an experimental database is analyzed for varying driving frequency (10Hz-1kHz) under fixed input (actuation) voltages in order to find a threshold frequency from which there is no frequency-dependence and, for varying input voltages (20V-400V) under a fixed driving frequency, a threshold voltage from which there is no field-dependence is searched. Then, the Levenberg-Marquardt-Fletcher algorithm is adapted and implemented in order to optimize two-parameter additive and multiplicative power laws for modelling the FDNL of soft piezoceramics. It is found that, while the additive power law is slower than the multiplicative one, they perform similarly for wide ranges of driving frequency (200Hz-1kHz) and actuation voltage (100V-400V). Besides, their two parameters are found to be frequency-dependent.