

## **Experimental system dependent factors in the measurement of ultrasonic nonlinear parameter by using contact PZT transducer**

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### **Abstract**

Ultrasonic nonlinearity has been considered as a promising method to evaluate the micro damage of material; however, its magnitude is so small that its measurement is not easy. Especially, when we use contact PZT transducer, if the contacting pressure is not kept in constant during the measurement then there exists extraneous fluctuation in the measured nonlinearity caused by the unstable contact condition. Also the system dependent harmonic component remained in the transmitted signal may cause over-estimation of nonlinear parameter. Thus, in this study, we investigate the effects of such experimental system dependent factors in the measurement of ultrasonic nonlinear parameter by using contact PZT transducer. Experimental results showed that the contact pressure should be kept greater than a number of 100kPa to ensure the reliability of measurement, and that the incident wave energy should be sufficiently large to reduce the effect of system dependent harmonics. These results will be very useful to find out the proper experiment condition to measure rather accurate nonlinear parameter.

**Key word:** Ultrasonic Nonlinear Parameter, Contacting Pressure, Pneumatic Control, System Dependent Harmonic, Material Dependent Harmonic