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### 压电陶瓷短圆柱耦合振动的研究

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### THE STUDY OF THE RADIAL-AXIAL COUPLING VIBRATION FOR PIEZOELECTRIC-CERAMICS-CYLINDRICAL-VIBRATOR

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摘要

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摘要 压电陶瓷圆柱振子的振动问题,由于厚向振动和径向振动之间的耦合作用,使问题变得非常复杂。迄今为止,许多研究者在这方面所做的工作,大体上可分为两类:一类是从各向同性圆柱体振动的近似解出发,求解压电陶瓷圆柱振子的振动问题;另一类是从压电陶瓷圆柱振子的压电本构方程组和运动方程组出发,利用数学上的伴随算子法计算其数值解。这两种方法不仅运算过程都相当复杂,而且都不能直观地反映出压电振子的物理

关键词:

Abstract: In this paper we have obtained a zero-order approximate solution of the partial differential equations with the separation of variables for the piezoelectric-ceramics-cylindrical vibrator on the assumptions of  $D_1 = 0$  and  $D_3 = \text{const}$ . Using this solution, the modification of electric displacement  $D$  caused by the inverse piezoelectric effect can be calculated by the charge -continuity equation. By substituting the modificative  $D$  in the above partial differential equations, we get a first-order approximate solution for the vibrator. The theoretical solution is in agreement with the experimental measurements.

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