Workpiece Defect Detection Using Piezoelectric-Instrumented Fixtures for Machining of Metal Matrix Composites

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Abstract

Using piezoelectric impedance sensors embedded in machining fixtures and clamps, the structural integrity of parts can be monitored. When considering the high cost of machining and finishing metal matrix composite (MMC) parts, this technology can prevent continuing to machine parts after defects appear during their processing. An autoregressive piezoelectric impedance sensor model is proposed which only requires analysis of a single signal. The proposed defect detection metric based on this model is validated experimentally and is shown to be able to detect defects, such as cracks, on MMC parts which cause undesired performance.