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## Electromechanical Impedance Technique and Scanning Vibrometry for Structure Characterization

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The operating principle of electromechanical impedance method is based on measurement and analysis of impedance - based quantities of piezoelectric transducers bonded on or embedded in investigated structure. The method assumes that any structural change (especially damage) should influence the impedance characteristics of the transducers. Electromechanical coupling between transducer and the host structure causes that mechanical resonances can be seen as peaks in impedance characteristics.

In this paper the impedance method was used to diagnose the structural state of isotropic beam. The piezoelectric elements were bonded to the surface of the host structure and supplied by alternating low voltage source. Different measurement cases were investigated using various configurations of power supply to piezoelectric transducers such as different or the same polarization applied to transducers bonded on the opposite sides of the beam. Piezoelectric transducers were supplied from the same source, so they also affected each other. Transducers used in experiment are a CeramTec SONOX P502 piezoelectric transducers. Measurements were conducted using Impedance Analyzer - HIOKI IM3570 for wide frequency range. Results showed that there was a significant difference in electric parameters of these two transducers related to changes in polarization of supplying voltage to them.

The electromechanical impedance method is widely used in high frequency range. It can be treated as modal analysis for high frequencies (up to MHz), because the impedance is directly related to frequency response function of the system. However the method is also influenced by electrical characteristic of piezoelectric transducers. In order to support these statements scanning laser vibrometry was used to learn about the relationship between the mode shapes of structure and resonant peaks in electromechanical response.

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**Ключевые слова:**

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