

The influence of frequency band on the testing sensitivity of coating structure by electro-mechanical impedance method in kHz and MHz frequency ranges

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Summary

Abstract: Two kinds of plasma sprayed Cr₂O₃ coatings are tested with electro-mechanical impedance (EMI) method. The influence of frequency band on the testing sensitivity of EMI method is investigated in kHz and MHz frequency ranges. The frequency shifts and root mean square deviation (RMSD) of the PZT electric impedance signatures are used as evaluation indicator. The variation of EMI sensitivity is investigated on 8 frequency bands with high mode density in the frequency ranges of 0.1-600 kHz and 1-10 MHz. The results show that in the low frequency range, the frequency shifts increase and the RMSD values first increase and then decrease with the increase of frequency band. The reason may be attributed to the decrease of peak number and impedance magnitude with the increase of testing frequency. In the high frequency range, the shifts of impedance peaks become more obvious, and a significant frequency shift of 247 kHz is observed near 6 MHz frequency. The RMSD values are also much larger than the low frequency range.

