

Vibration Testing for Detecting Internal Corrosion

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The vibration behavior of structures can be characterized in terms of resonance frequencies and mode shapes which describe properties of the tested object in a global way but do not in general provide information about structural details. Following an asymptotic formalism, we derive asymptotic formulae for the effects of corrosion on resonance frequencies and mode shapes. Based on these formulae we develop a simple method to address the inverse problem of identifying an internal corrosive part of small Hausdorff measure in a pipeline by vibration analysis. The viability of our reconstruction method is documented by a variety of numerical results from synthetic, noiseless and noisy data.

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