Research Article

Spectral Ratios for Crack Detection Using P and Rayleigh Waves

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We obtain numerical results to help the detection and characterization of subsurface cracks in solids by the application of P and Rayleigh elastic waves. The response is obtained from boundary integral equations, which belongs to the field of elastodynamics. Once the implementation of the boundary conditions has been done, a system of Fredholm integral equations of the second kind and order zero is found. This system is solved using the method of Gaussian elimination. Resonance peaks in the frequency domain allow us to infer the presence of cracks using spectral ratios. Several models of cracked media were analyzed, where effects due to different crack orientations and locations were observed. The results obtained are in good agreement with those published in the references.

1. Introduction

It is well known that the presence of cracks in structural components leads to integrity problems. Cracks in materials used in mechanical and civil engineering cause reduction in strength which leads to instability, leakage, or collapse depending on the cracked component.