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ELASTODYNAMIC RESPONSE OF AN ANISOTROPIC MEDIUM IN FREQUENCY DOMAIN

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Abstract: Two-dimensional elastodynamic displacements and stresses for a monoclinic solid have been obtained in frequency domain in relatively simple form. The eigenvalue method, following Fourier transform, has been used to obtain the response in the transformed domain. The analytic eigenvalue method for a monoclinic solid, presented in this paper, is straightforward and is convenient for numerical computation. The use of matrix notation avoids unwieldy mathematical expressions. A particular case of a normal line-load acting in the interior of an infinite orthotropic solid has been considered in detail. The corresponding deformation in frequency domain is obtained numerically. The variations of dimensionless displacements and stresses with the horizontal distance have been shown graphically.

Keywords and Phrases: Two-dimensional deformation, anisotropy, frequency domain, eigenvalue method
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1. Introduction

The displacement Green's functions for a homogeneous isotropic linearly elastic solid are classical results in elastodynamic theory. Stokes [26] read a paper on the dynamical theory of diffraction. He obtained an exact solution for the displacement field due to a tangential force in an infinite elastic solid. Thus, without knowing it, he had conceived the first mathematical model of an earthquake. Later on, Lamb [12] presented a paper "On the propagation of tremors over the surface of an elastic solid". Soon afterwards, Love [14] studied a paper on "The propagation of wave-motion in an isotropic elastic solid medium". The Stokes-Love formulation assumed a localized harmonic force in an elastic isotropic medium. By differentiation and addition, Love [15] obtained the dynamical response to dipoles, couples, double couples, explosions, etc. The three-dimensional elastodynamic result for isotropic solids has been also obtained, amongst others, by Maruyama [16], Achenbach [1], Niwa *et al.* [19] and Karabolis and Beskos