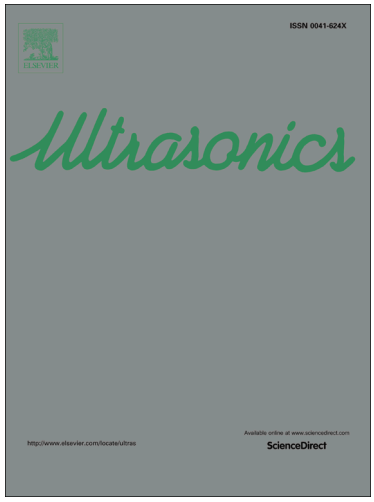

Rayleigh-type waves in nonlocal micropolar solid half-space

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Abstract

Propagation of Rayleigh type surface waves in nonlocal micropolar elastic solid half-space has been investigated. Two modes of Rayleigh-type waves are found to propagate under certain approximations. Frequency equations of these Rayleigh type modes and their conditions of existence have been derived. These frequency equations are found to be dispersive in character due to the presence of micropolarity and nonlocality parameters in the medium. One of the frequency equations is a counterpart of the classical Rayleigh waves and the other is new and has appeared due to micropolarity of the medium. Phase speeds of these waves are computed numerically for Magnesium crystal and their variation against wavenumber are presented graphically. Comparisons have been made between the phase speeds of Rayleigh type waves through nonlocal micropolar, local micropolar and elastic solid half-spaces.

Keywords: Nonlocal; Micropolar; Elastic solid; Rayleigh waves; Dispersion; Phase speed.

1. Introduction

Lord Rayleigh [1] has shown that there exists a type of wave which can propagate along the boundary surface of an elastic solid half-space. The motion associated with this wave is found to be the combination of longitudinal and transverse waves, and decay with distance from the boundary surface into the half-space (see Love [2]). The present work is concerned with the propagation of Rayleigh type surface waves in micropolar elastic solid half-space. Eringen [3] introduced micropolar theory of elasticity and presented the constitutive relations and field equations for micropolar elastic solid within the context of linear theory. Parfitt and Eringen [4] have investigated the possibility of propagation of