

# Improved approximations of the Rayleigh wave velocity

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**Abstract:** In this article we have derived some approximations for the Rayleigh wave velocity in isotropic elastic solids which are much more accurate than the ones of the same form, previously proposed. In particular: (1) A second (third)-order polynomial approximation has been found whose maximum percentage error is 29 (19) times smaller than that of the approximate polynomial of the second (third) order proposed recently by Nesvijski [Nesvijski, E. G., *J. Thermoplas. Compos. Mat.* 14 (2001), 356-364]. (2) Especially, a fourth-order polynomial approximation has been obtained, the maximum percentage error of which is 8461 (1134) times smaller than that of Nesvijski's second (third)-order polynomial approximation. (3) For Brekhovskikh-Godin's approximation [Brekhovskikh, L. M., Godin, O. A. 1990, *Acoustics of Layered Media: Plane and Quasi-Plane Waves*. Springer-Verlag, Berlin], we have created an improved approximation whose maximum percentage error decreases 313 times. (4) For Sinclair's approximation [Malischewsky, P. G., *Nanotechnology* 16 (2005), 995-996], we have established improved approximations which are 4 times, 6.9 times and 88 times better than it in the sense of maximum percentage error. In order to find these approximations the method of least squares is employed and the obtained approximations are the best ones in the space  $L^2[0, 0.5]$  with respect to its corresponding subsets. © SAGE Publications 2008.

**Author Keywords:** Method of least squares; Rayleigh wave velocity; The best approximation

**Index Keywords:** Acoustic wave velocity; Curve fitting; Elastic waves; Fluid dynamics; Fluid mechanics; Ketones; Least squares approximations; Polynomials; Rayleigh waves; Seismic waves; Solids; Waves; Elastic solids; Fourth order polynomial; In order; Layered medium; Method of least squares; Percentage error; Plane waves; Rayleigh wave velocity; Springer (CO); Polynomial approximation

Year: 2008

Source title: Journal of Thermoplastic Composite Materials

Volume: 21

Issue: 4

Page : 337-352

Cited by: 2

Link: [Scopus Link](#)

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ISSN: 8927057

CODEN: JTMAE

DOI: 10.1177/0892705708089479

Language of Original Document: English

Abbreviated Source Title: Journal of Thermoplastic Composite Materials

Document Type: Article

Source: Scopus

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