PAMM *Explore this journal >*

View issue TOC
Volume 13, Issue 1
December 2013
Pages 329–330
Special Issue:
84th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM), Novi Sad 2013; Editors:
...Show more
Section 12

Numerical analysis of wave propagation in fluid-filled deformable tubes

David Uribe , Holger Steeb, Erik H. Saenger, Patrick Kurzeja, Oscar Ruiz

First published:
29 November 2013 Full publication history

DOI:
10.1002/pamm.201310160 View/save citation

Abstract

The theory of Biot describing wave propagation in fluid saturated porous media is a good effective approximation of a wave induced in a fluid-filled deformable tube. Nonetheless, it has been found that Biot's theory has shortcomings in predicting the fast P-wave velocities and the amount of intrinsic attenuation. These problems arises when complex mechanical interactions of the solid phase and the fluid phase in the micro-scale are not taken into account. In contrast, the approach proposed by Bernabe does take into account micro-scopic interaction between phases and therefore poses an interesting alternative to Biot's theory. A Wave propagating in a deformable tube saturated with a viscous fluid is a simplified model of a porous material, and therefore the study of this geometry is of great interest. By using this geometry, the results of analytical and numerical results have an easier interpretation and therefore can be compared straightforward. Using a Finite Difference viscoelastic wave propagation code, the transient response was simulated. The wave source was modified with different characteristic frequencies in order to gain information of the dispersion relation. It was found that the P-wave velocities of the simulations at subcritical frequencies closely match those of Bernabe's solution, but at over-critical frequencies they come closer to Biot's solution.

Continue reading full article

Related content

Articles related to the one you are viewing

The articles below have been selected for you based on the article you are currently viewing.

Analysis of Thermal Stress in Tubesheets with Hydraulically Expanded Tubes

R. Aberl, K. Strohmeier

30 October 2002

Evaluation of residual welding stresses and fatigue crack behavior in tubular K-joints in compression

Claire Acevedo, Alain Nussbaumer, Jean-Marie Drezet

1 July 2011

The Need for Speed in Rodent Locomotion Analyses

Richard J. Batka, Todd J. Brown, Kathryn P. Mcmillan, Rena M. Meadows, Kathryn J. Jones, Melissa M. Haulcomb

2 June 2014

Multi-offset ground penetrating radar methods to image buried foundations of a medieval town wall, Great Yarmouth, UK

Adam D. Booth, Roger A. Clark, Ken Hamilton, Tavi Murray

30 April 2010

Relative flight responses of *Rhagoletis indifferens* as influenced by crowding, sex, and resources

Susan E. Senger, Bernard D. Roitberg, Howard M.A. Thistlewood

12 March 2007

WILEY

Browse Publications

Browse by Subject

Resources

Help & Support

Cookies & Privacy

Terms & Conditions

About Us

Wiley Job Network

Advertisers & Agents