

[1]南景富,齐辉,韩刘,等.SH波作用下地表覆盖层与浅埋圆柱形夹杂的相互作用[J].自然灾害学报,2010,02:169-174.

NAN Jing-fu,QI Hui,HAN Liu,et al.Interaction between ground coverage layer and shallow buried cylindrical inclusion under action of SH-wave[J].,2010,02:169-174.

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SH波作用下地表覆盖层与浅埋圆柱形夹杂的相互作用

《自然灾害学报》[ISSN:/CN:23-1324/X] 期数: 2010年02期 页码: 169-174 栏目: 出版日期: 2010-02-01

Title: Interaction between ground coverage layer and shallow buried cylindrical inclusion under action of SH-wave

作者: 南景富^{1, 2}; 齐辉¹; 韩刘³; 折勇¹

1. 哈尔滨工程大学航天与建筑工程学院, 黑龙江哈尔滨 150001;
2. 黑龙江科技学院数力系, 黑龙江哈尔滨 150027;
3. 中国航空工业哈尔滨飞机工业集团有限责任公司, 黑龙江哈尔滨 150027

Author(s): NAN Jing-fu^{1, 2}; QI Hui¹; HAN Liu³; SHE Yong¹

1. Aerospace and Civil Engineering College, Harbin Engineering University, Harbin 150001, China;
2. Department of Mathematics and Mechanics, Heilongjiang Institute of Science and Technology, Harbin 150027, China;
3. AVIC Harbin Aircraft Industry Group Limited Liability Company, Harbin 150060, China

关键词: SH波散射; 地表覆盖层; 浅埋圆柱形夹杂; 波函数展开法; 动应力集中系数

Keywords: SH scattering wave; ground coverage layer; shallow cylindrical inclusion; wave functions expansion method; dynamic stress concentration factor

分类号: O343.1;P315.3

DOI: -

文献标识码: -

摘要: 利用复变函数法和多极坐标移动技术研究了SH波作用下地表覆盖层与浅埋圆柱形弹性夹杂的相互作用,并给出了圆柱形夹杂周边动应力集中系数的数值结果。首先,为了克服直接构造波函数场的困难,采用一个半径很大的圆形边界来拟合半空间的直边界,因而,具有地表覆盖层的半空间直边界问题就转化成了曲面边界问题,可采用大圆弧假定法求解;其次,借助Helmholtz定理预先写出问题波函数的一般形式解,再利用边界条件并借助复数Fourier-Hankel级数展开将问题化为求解波函数中未知系数的无穷线性代数方程组;最后,截断该无穷代数方程组,以求得该问题的数值结果。分析表明,半空间地表覆盖层的存在,即使其厚度很薄,对入射SH波的散射也具有很大的影响。

Abstract: The scattering of SH-wave by a subsurface cylindrical inclusion in a layered elastic half-space was investigated,based on the complex function method and wave functions expansion method.Firstly,the solution of scattering of SH-wave was given for the case of a cylindrical inclusion embedded in a layered half-space with an almost flat circular boundary to approximate the straight boundary of

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surface elastic layer. Secondly, by using the theory of Helmholtz, the general solution of the Biot's wave function is given, and a system of infinite linear algebraic equations of the present problem can be given by means of the complex series expansion technology and the boundary conditions of the problem. Finally, the dynamic stress concentration factors around the cylindrical inclusion are discussed for the cases of different stiffness and thickness of the surface elastic layer in numerical examples. The results show that the existence of a surface layer on a half-space, even if it is very thin, has great effect on scattering plane SH-wave.

参考文献/REFERENCES

- [1] 王铎, 马兴瑞, 刘殿魁. 弹性动力学最新进展[M]. 北京: 科学出版社, 1995.
- [2] Pao Y H. Elastic Waves in Solids[J]. ASME Journal of Applied Mechanics, 1983(4): 1152-1164.
- [3] 王铎, 汪越胜. 界面动力学研究近况[J]. 上海力学, 1993(4): 1-15.
- [4] 林皋. 地下结构抗震分析综述(上)[J]. 世界地震工程, 1990, 5(2): 1-10.
- [5] Pao Y H. Applied mechanics in science and engineering[J]. Applied Mechanics Review, 1998, 51(2): 141-153.
- [6] 陈涛, 胡超, 黄文虎. P波入射时含圆柱形空腔板弹性波散射与动应力集中[J]. 地震工程与工程振动. 2006, 26(4): 32-36.
- [7] 杨宇. 含圆弧形沉积的楔形地形对平面SH波和P波的散射[D]. 天津: 天津大学, 2005: 1-68.
- [8] CAO H and LEE V W. Scattering and diffraction of plane P-waves by circular cylindrical canyons with variable depth-to-width ratio[J]. Soil Dynamics and Earthquake engineering, 1990, 9(3): 141-150.

备注/Memo: 收稿日期: 2009-5-12; 改回日期: 2010-3-29。

基金项目: 国家自然科学基金资助项目(10972064)

作者简介: 南景富(1967-), 男, 副教授, 博士研究生, 主要从事减灾工程研究. E-mail: nanjingfu888@163.com
