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Title: 2.5D scattering of incident plane P waves by a canyon in layered half-space

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关键词: [层状半空间](#); [凹陷地形](#); [2.5维散射](#); [平面P波](#)

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摘要: 采用间接边界元法研究了层状半空间中凹陷地形对斜入射平面P波的2.5维散射问题。取无限长凹陷地形任一横截面,将边界以斜线单元离散,通过自由场反应分析,求得假想边界上各单元的应力响应。施加虚拟移动均布斜线荷载,求得应力格林函数。根据凹陷边界上的零应力边界条件确定虚拟移动均布斜线荷载密度,将自由场响应和虚拟移动均布斜线荷载产生的响应叠加起来,即得到问题的解答。通过与已有结果的对比,验证了本文方法的正确性。最后,以均匀弹性半空间和基岩上单一土层中凹陷地形对斜入射平面P波的2.5维散射为例,进行了数值计算分析,结果表明:凹陷地形的2.5维散射和二维散射之间存在明显差异;层状半空间中凹陷地形和均匀半空间中凹陷地形对波的散射作用存在显著差别。分析了造成差别的原因,并深入讨论了入射角度、覆盖层厚度和刚度对散射作用的影响。

Abstract: This paper presents 2.5D scattering of incident plane P waves by a canyon in layered half-space by the indirect boundary element method(IBEM).The free-field response was carried out to give the stresses on the line which forms boundary of the canyon.The fictitious uniform moving loads were applied on the same line to calculate the Green' s functions for the stresses.The amplitudes of the loads were determined by the boundary conditions.The displacements due to the free field and from the fictitious uniform moving loads have to be added to obtain the whole motion.The numerical results were carried out for the cases of a canyon in homogenous and in one layer over bedrock and the accuracy of the method were verified by comparing with related results.The results show that the 2.5D

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wave scattering problem is essentially different from the 2D case, and there exist distinct differences between the wave amplification by a canyon in layered half-space and that in homogeneous half-space. The reasons for the distinct difference were explored, and the effects of the thickness, incidence angle and stiffness of the layer on the amplification were discussed.

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