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具有饱和土沉积层的充水河谷对平面瑞雷波的散射

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摘要 针对具有饱和土沉积层的充水河谷对平面瑞雷波的散射问题，把半空间场地用单相弹性介质模拟，河谷中的饱和土沉积层用Biot饱和多孔介质动力理论模拟，河谷中的水假定为无黏性流体（理想流体），利用波函数展开法在频域内给出了具有饱和土沉积层的圆弧形充水河谷对平面瑞雷波散射问题的解析解答.文中给出了算例，计算了不同输入频率和高宽比时河谷谷底的位移幅值.算例表明由于具有饱和土沉积层的充水河谷存在，使得河谷谷底的位移幅值放大4倍多，并且它的幅值随着河谷谷底位置的不同而产生较大的变化.

关键词 河谷 平面瑞雷波 散射 饱和土 理想流体
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Scattering of plane Rayleigh waves by circular-arc alluvial valleys with saturated soil deposits and water layer

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Abstract An analytic solution of two-dimensional scattering and diffraction of plane Rayleigh waves by circular-arc alluvial valley with saturated soil deposits and water was presented. The Fourier-Bessel series expansion technique was used with the deposits simulated by the Biot dynamic theory for saturated porous media, the half space assumed to be elastic single-phase media, and the water in the valleys simulated by perfect fluid. Numerical results are given to show the displacement amplitudes on the valley floor. The analytical results show that some surface displacement amplitudes of the valley floor are amplified to more than 4 times, and it changes with the location of the observation points apparently.

Key words Valleys; Plane Rayleigh waves; Wave scattering; Saturated soil deposit; Perfect fluid

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