散体流动场中波的传播与振动助流机理

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摘　　要：　视流动场中的散体为弱横观各向同性介质，推导了 P波、SH波和SV波的相速度表达式，分析了它们在流动散体介质中的传播特点：P波波前为椭圆形或近似椭圆形，SH波波前为椭圆形，SV波波前为非椭圆形。　由波的传播特点得出在振幅和频率较小的情况下，振波对散体的流动性影响不大。当振幅和频率逐渐增加时，　椭球体的偏心率减小，散体间的粘性阻力和内摩擦力降低，散体的松散系数增加，抗剪强度降低，使散体具有更好的流动性。实验结果验证了推导与分析的正确性。

关键字：　散体介质；　体波传播；　椭球体；　振动助流

Wave propagation and mechanism of aided flow by vibration in granular flow field

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Abstract: The flowing granular media was regarded as weak transverse isotropic media, and the phase velocity expressions of P wave, SH wave and SV wave were deduced. The propagation specialities of waves in flowing granular media were analyzed. The wavefront of P wave is elliptic or approximately elliptic, the wavefront of SH wave is elliptic, and the wavefront of SV is not elliptic. In terms of specialties of wave propagation it can be deduced that vibrating waves have less influence on fluidity of granules when the amplitude and frequency are small. However, when the amplitude and frequency increase gradually, the eccentricity of ellipsoid, the viscosity resistance and inner friction among granules and shear intensity of granules decrease, as well as the loosening coefficient of granules increase, so that the granules have better fluidity. The results of experiment have proved the conclusion and analysis.

Key words: granular media; bodily wave propagation; ellipsoid; aided flow by vibration