Dynamic Behavior of a Saturated Poroelastic Soil Layer Subject to Surface Disturbance

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ABSTRACT　　In order to reveal the importance of the viscous effect on the dynamic response of a fluid saturated poroelastic soil layer of finite thickness when subjected to periodical motion, say oscillatory surface disturbances, viscosity of water is considered herein. Homogeneous water is governed by the theory of viscous fluid flow and the poroelastic soil obeys Biot's poroelastic theory. The governing equations of the soil layer are decoupled into four Helmholtz equations without losing physical generality. The proposed boundary value problem is solved by a semi-analytical algorithm of which twelve undetermined coefficients of the general solutions must be obtained simultaneously. The results are compared with those obtained by potential model, and compared with those of poroelastic soil layer of infinite thickness to show the impermeable rigid boundary effect.

Key Words:　　pore water pressure; effective stress; viscous model; boundary effect.

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