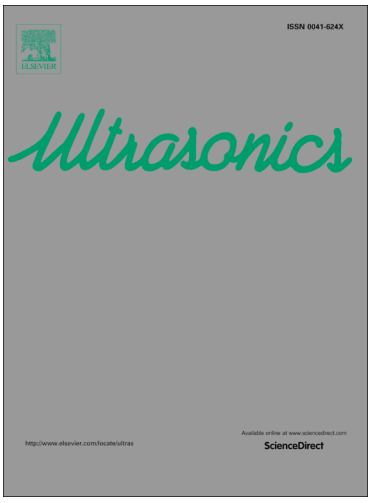

Propagation characteristics of interface waves between a porous medium and a sediment-containing two-phase fluid

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Propagation characteristics of interface waves between a porous medium and a sediment-containing two-phase fluid

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Abstract : Based on the modified Biot theory of Johnson, the propagation characteristics of the various interface waves at an interface between a semi-infinite fluid and a porous medium were studied. First, based on the characteristic equations of open-pore and sealed-pore, which were derived from the wave equations, time-domain waveforms at the interface were obtained by inverse Fourier transform. The effects of the longitudinal frame modulus on the interface waves were investigated. For open-pore and sealed-pore, the effect of porosity on the propagation of the interface waves was studied; the porosity was found to strongly influence the true surface wave. Based on four ultrasonic suspension models—Utrick, Utrick-Ament (UA), Harker–Temple (HT) and McClement，the pseudo-Stoneley wave propagation characteristics were analyzed at the interface between the sediment-containing two-phase fluid and the porous medium solid. The effects of volume fraction and particle diameter on the phase velocity, attenuation coefficient and dispersion for the pseudo-Stoneley and true surface wave were discussed, and the results demonstrated that the properties of the fluid strongly impacted the pseudo-Stoneley wave but exerted very little effect on the true surface wave. The conclusions drawn in this paper could contribute to elucidate the parameters of