

APPENDIX A

The Characteristics of Reflection and Transmission Coefficients of Porous Medium Saturated with an Ideal Fluid

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The equation of reflection and transmission coefficients at the interface of porous media have been derived in equation 19, and the specific expression of the parameters

B, **C**, **Ip**, **Is** are as follows.

$$\mathbf{B} = \begin{bmatrix} p_{11} & p_{12} & -k & 0 & 0 & 0 \\ -k & -k & -p_{13} & 0 & 0 & 0 \\ \gamma_{11}p_{11} & \gamma_{12}p_{12} & -\Gamma_{11}k & 0 & 0 & 0 \\ a_{11} + \alpha_1 b_{11} & a_{12} + \alpha_1 b_{12} & -2\mu_1 k p_{13} & 0 & 0 & 0 \\ -2\mu_1 k p_{11} & -2\mu_1 k p_{12} & \mu_1 (k^2 - p_{13}^2) & 0 & 0 & 0 \\ -b_{11} & -b_{12} & 0 & 0 & 0 & 0 \end{bmatrix}, \quad (\text{A1})$$

$$\mathbf{C} = \begin{bmatrix} 0 & 0 & 0 & -p_{21} & -p_{22} & -k \\ 0 & 0 & 0 & -k & -k & p_{23} \\ 0 & 0 & 0 & -\gamma_{21}p_{21} & -\gamma_{22}p_{22} & -\Gamma_{21}k \\ 0 & 0 & 0 & a_{21} + \alpha_2 b_{21} & a_{22} + \alpha_2 b_{22} & 2\mu_2 k p_{23} \\ 0 & 0 & 0 & 2\mu_2 k p_{21} & 2\mu_2 k p_{22} & \mu_2 (k^2 - p_{23}^2) \\ 0 & 0 & 0 & -b_{21} & -b_{22} & 0 \end{bmatrix}, \quad (\text{A2})$$

$$\mathbf{Ip} = [-p_{11} \quad -k \quad -\gamma_{11}p_{11} \quad a_{11} + \alpha_1 b_{11} \quad 2\mu_1 k p_{11} \quad -b_{11}]^T, \quad (\text{A3})$$

$$\mathbf{Is} = \begin{bmatrix} -k & p_{11} & -\Gamma_{11}k & 2\mu_1 k p_{11} & \mu_1 (k^2 - p_{11}^2) & 0 \end{bmatrix}^T, \quad (\text{A4})$$

$$a_{lj} = \left(K_l + \frac{4}{3} \mu_l \right) p_{lj}^2 + \left(K_l - \frac{2}{3} \mu_l \right) k^2, l=1,2, j=1,2, \quad (\text{A5})$$

$$b_{lj} = (\alpha_l + \gamma_{lj}) M_l (k^2 + p_{lj}^2), l=1,2, j=1,2. \quad (\text{A6})$$

Where, $K_l, \mu_l, l=1,2$ are the bulk and shear moduli of rock skeleton, respectively. $\gamma_{lj}, \Gamma_{lj}, l=1,2, j=1,2$ represent the ratios of seismic wave's amplitudes of pore fluids relative to rock skeleton corresponding P- and S-waves, respectively. $\alpha_l, M_l, l=1,2$ are Biot parameters, $l=1,2$ denote the porous media in the top and bottom layers, $j=1,2$ represent the fast P- and slow P-waves, respectively.