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Quasi-static response for a multilayered half space using a thermal non-equilibrium model

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In this paper, a one dimensional mathematical model of multilayered half space with a prescribed loading are presented first. The local thermal non-equilibrium condition is introduced in the governing equations to make a distinction from the local thermal equilibrium condition in traditional model. The analytical solution of displacement, temperature, pore pressure and effective stress are derived by the method of Laplace transform. In numerical simulation, the quasi-static response of a double-layered half space with specified parameters and impact thermal loading are investigated. It is shown that, due to the perpendicular non-homogeneity the quasi-static response of multilayered half space is different from that of uniform half space. The temperature distribution fulfilling local thermal non-equilibrium condition is different from that fulfilling local thermal equilibrium condition, especially when the coefficient of interface heat exchange is very small. And this distinction will result in the significant difference in displacement, pore pressure and effective stress.

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