

Modelling of Transient Ground Surface Displacements Due to a Point Heat Source

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Abstract

Using Laplace-Hankel integral transformations, transient closed-form solutions of the thermally induced ground surface displacements, excess pore water pressure and temperature increment due to an instantaneous point heat source buried in an isothermal permeable half space are presented and discussed. The basic formulations of the governing equations are on the basis of Biot's three-dimensional consolidation theory of porous media. Numerical results show that the maximum ground surface horizontal displacement is around 38.5% of the maximum ground surface vertical displacement. The study concludes that the thermally induced horizontal displacement is significant. The solutions may be used to test numerical models and numerical simulations of the thermoelastic processes near the heat sources.

Keyword : Point Heat Source, Transient Ground Surface Displacements, Half Space