

Numerical analysis of geothermal system for Delhi silt soil in India

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Abstract

The present study is focused on the numerical analysis of geothermal system to explore the feasibility of geothermal pile in Delhi silt soil under the summer dominant Indian climatic condition. The heat flow mechanism through geothermal system is simulated by developing finite difference models of a simple rod with the equivalent material property of heat carrying pipe and fluid, inserted in soil. The results of finite difference analyses show that the temperature of analysis domain is reached in a steady state within a reasonable time. Moreover, the feasibility of geothermal pile in Indian climatic condition for Delhi silt soil is established by showing that the heat exchange operation during the period of extreme summer or winter yields negligible change on surrounding soil temperature. The study also attempts to find the appropriate rod length condition (finite or infinite) in the analysis for the most realistic design solution.