

Advanced Finite Difference Method for Study Energy Piles Behavior in Temperature Dependent Soils

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Abstract

Recently, the use of energy piles with the dual purpose of supplying energy and the bearing of superstructures is becoming widespread. Providing a proper and efficient numerical analysis can help to accelerate this process. For this purpose, this study tried to develop some features of finite difference method which is used in Thermo-Pile. The proposed numerical model can consider the effects of soil temperature dependence on energy piles behavior. Another capability of the proposed method to model temperature distribution in surrounding soil could result in applying temperature effect on soil behavior. This study has shown that there are good agreements between numerical results and experimental observations. Relating side shear resistance of soil to temperature gives a better prediction of pile response for the higher temperature. The pile behavior for various input parameters was studied. Based on obtained results, the pile response to thermomechanical loads depends on the various properties of pile and soil such as diameter, length, side shear and toe resistance.