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A Numerical Study into Effects of Intermittent Pump Operation on Thermal Storage in Unsaturated Porous Media

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Abstract

In this paper, the effects of varying soil properties and intermittent pump operation on the performance of the thermal storage system are examined using finite element numerical simulation. Furthermore, 10 days of intermittent operation, which involved different modes of pump operation like permanent on-and-off mode condition, 12-hour active mode and 12-hour off mode and unequal hours of pump operation are simulated in a single U-shaped pipe for both emitting and extracting modes and the cases have been selected for the various types of soil such as sand, silt, clay, and sandstone. According to the results, if the pump operates continuously, the heat increase is lower than which the pump switches off every 12 hours, due to the initial condition of re-launching the system. Also, the process of increasing the saved heat in unsaturated clay for several modes of pump operation in emitting mode indicated that for every

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