

Transient 3D Numerical Simulation of Horizontal Earth Water Heat Exchanger (EWHE)

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Abstract - In this paper, the thermal performance of a horizontal earth tube heat exchanger is investigated. A three-dimensional model has been created using ANSYS Fluent to study the performance of a ground horizontal earth water heat exchanger (EWHE). The effect of inlet water temperature, water velocity, soil thermal conductivity and ground surface temperature on the rate of heat transfer has been analyzed. The results have indicated a direct relation between soil thermal conductivity and the rate of heat transfer. On the other hand, an inverse relation has been observed between ground surface temperature and the rate of heat exchanged. The transient model shows that interim operation of EWHE is needed since ground becomes saturated with thermal energy.

Keywords: Earth water heat exchanger; shallow ground thermal energy; ground heat capacity; Soil thermal conductivity.