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ON THE THERMAL INTERACTION BETWEEN GEOTHERMAL BOREHOLES WITH GROUNDWATER FLOWS USING ASYMPTOTIC EXPANSION TECHNIQUES

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ABSTRACT

In order to fulfill both performance and cost requirements in a geothermal heat pump is crucial that its geothermal heat exchanger is optimally-sized. To achieve that, engineer needs an accurate forecast of the thermal response of the exchanger over the whole lifetime of the building. This thermal response can be highly affected by the presence of groundwater flows, hence both heat transfer mechanisms, conduction and convection, must be taken into account when solving the physical problem. In the present work a theoretical model has been developed which is capable of consider both heat transfer mechanisms for Peclet number of order unity of the groundwater flow. The model is based on the presence of large time and length disparities, it can be exploited using asymptotic expansion techniques.

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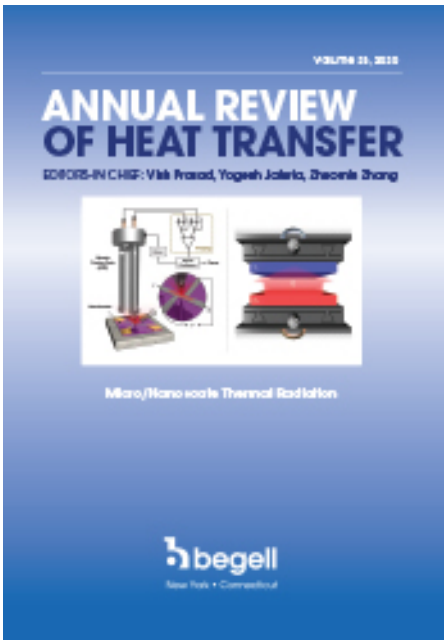

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