

# Evaluating the applicability of the radial approximation for pile heat exchangers

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## Abstract

This paper appraises the efficacy of using an analytical radial approximation for different thermal pile heat exchanger geometries. Unsteady radial heat-flow from fluid in a pipe set within a grouted borehole into the external ground is well-documented and can be solved analytically very rapidly using Laplace Transforms (Javed & Claesson, 2011). By comparing the radial model with finite-element simulations including explicit pile geometries, this paper provides a provisional analysis of the accuracy of this approach. Initial findings suggest that the radial model may provide an appropriate approximation to pile behaviour for certain pipe configurations, albeit with small 'mid-time' error.