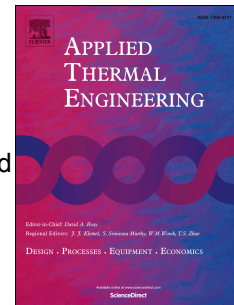


Accepted Manuscript

An Adaptive Segmentation Haar Wavelet Method for Solving Thermal Resistance and Capacity Models of Ground Heat Exchangers

A. Nguyen, P. Pasquier



PII: S1359-4311(15)00541-4

DOI: [10.1016/j.applthermaleng.2015.05.073](https://doi.org/10.1016/j.applthermaleng.2015.05.073)

Reference: ATE 6676

To appear in: *Applied Thermal Engineering*

Received Date: 4 March 2015

Revised Date: 20 May 2015

Accepted Date: 28 May 2015

Please cite this article as: A. Nguyen, P. Pasquier, An Adaptive Segmentation Haar Wavelet Method for Solving Thermal Resistance and Capacity Models of Ground Heat Exchangers, *Applied Thermal Engineering* (2015), doi: 10.1016/j.applthermaleng.2015.05.073.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 An Adaptive Segmentation Haar Wavelet Method for 2 Solving Thermal Resistance and Capacity Models of 3 Ground Heat Exchangers

4 A. Nguyen^{a,*}, P. Pasquier^a

5 ^a*Department of Civil, Geological and Mining Engineering, Polytechnique Montréal, P.O.*
 6 *Box 6079 Station Centre-Ville, Montréal, Canada H3C 3A7*

7 **Abstract**

Increasingly complex numerical models are nowadays often utilized for studying ground source heat pump. The differential equation systems representing these models are often both large and stiff and can be hard to solve with conventional implicit methods. In this work, an adaptive step size segmentation Haar wavelet method is developed for solving large stiff ODE systems representing ground heat exchanger models in order to compute the ground temperature distribution over time. Three models are studied in this work : the cylinder-source model, a standing column well model and a vertical closed-loop borehole model. The proposed method is compared with the numerical differentiation formulas method of order 1 to 5 in terms of backward differences. Results indicate that, for a similar accuracy, the proposed method is 3 to 17 times faster than state-of-the-art commercial solvers.

8 **Keywords:** Haar wavelet method, thermal resistance and capacity, ground
 9 heat exchanger, closed-loop borehole, standing column well

*Corresponding author

Email address: t.nguyen@polymtl.ca (A. Nguyen)

Download English Version:

<https://daneshyari.com/en/article/645347>

Download Persian Version:

<https://daneshyari.com/article/645347>

[Daneshyari.com](https://daneshyari.com)