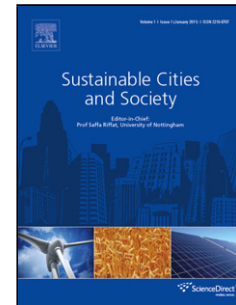


## Accepted Manuscript

Title: Experimental and numerical characterization of natural convection in a vertical shell-and-tube latent thermal energy storage system

Authors: Saeid Seddegh, Mahmood Mastani Joybari, Xiaolin Wang, Fariborz Haghighat



PII: S2210-6707(17)30223-8  
DOI: <http://dx.doi.org/doi:10.1016/j.scs.2017.07.024>  
Reference: SCS 718

To appear in:

Received date: 4-3-2017  
Revised date: 21-6-2017  
Accepted date: 31-7-2017

Please cite this article as: Seddegh, Saeid., Joybari, Mahmood Mastani., Wang, Xiaolin., & Haghighat, Fariborz., Experimental and numerical characterization of natural convection in a vertical shell-and-tube latent thermal energy storage system. *Sustainable Cities and Society* <http://dx.doi.org/10.1016/j.scs.2017.07.024>

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.

# Experimental and numerical characterization of natural convection in a vertical shell-and-tube latent thermal energy storage system

Saeid Seddegh<sup>a,1</sup>, Mahmood Mastani Joybari<sup>b</sup>, Xiaolin Wang<sup>a</sup>, Fariborz Haghighat<sup>b</sup>

<sup>a</sup>School of Engineering & ICT, University of Tasmania, Hobart, TAS 7001, Australia.

<sup>b</sup>Department of Building, Civil and Environmental Engineering, Concordia University, Montreal, H3G 1M8, Canada.

## Highlights

- Physics of heat transfer in a vertical LHTES system was experimentally investigated.
- Natural convection induced vertical and horizontal circulation in the storage unit.
- Vertical convection was responsible for thermal energy transfer from HTF to PCM.
- Horizontal convection circulation was responsible for energy transfer within the PCM.
- The experimental findings were further explained using numerical simulation.

## Abstract

In this paper, physics of heat transfer mechanism in vertical cylindrical shell-and-tube latent heat thermal energy storage (LHTES) systems is investigated. Visualized experiments are carried out to investigate the evolution of the liquid/solid interface of a phase change material (PCM). The temporal variation of the experimental temperature is then used to investigate the effect of natural convection on heat transfer in the PCM. A combined conduction/convection model is applied to investigate the melted PCM's convective circulation

---

<sup>1</sup> Email: saeid.seddeghkiyaroudi@utas.edu.au; Tel: 61-3-62262133; Fax: 61-3-62267247

Download English Version:

<https://daneshyari.com/en/article/4928075>

Download Persian Version:

<https://daneshyari.com/article/4928075>

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