

Accepted Manuscript

Research Paper

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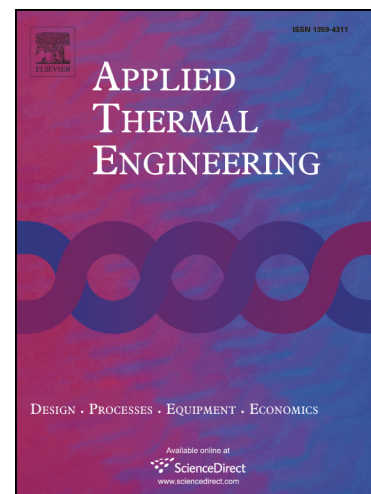
PII: S1359-4311(17)30520-3
DOI: <http://dx.doi.org/10.1016/j.applthermaleng.2017.07.112>
Reference: ATE 10780

To appear in: *Applied Thermal Engineering*

Received Date: 28 January 2017
Revised Date: 22 June 2017
Accepted Date: 16 July 2017

Please cite this article as: A. Labihi, F. Aitlahbib, H. Chehouani, B. Benhamou, M. Ouikhalfan, C. Croitoru, I. Nastase, Effect of phase change material wall on natural convection heat transfer inside an air filled enclosure, *Applied Thermal Engineering* (2017), doi: <http://dx.doi.org/10.1016/j.applthermaleng.2017.07.112>

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Effect of phase change material wall on natural convection heat transfer inside an air filled enclosure

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Abstract

This paper deals with a numerical and experimental study of a square enclosure filled with air and differentially heated. The heated vertical wall of the enclosure contains a 1 cm thickness layer of a phase change material (PCM), whereas the opposite one is cooled. The dimensions of the experimental air cavity are 10 cm x 10 cm with a width of 10 cm. The PCM layer, initially molten, is discharged in the air within the cavity. Temperature measurements were performed inside the air cavity as well as the PCM and the PCM/air interface during the charging and discharging processes. A numerical model based on the coupled Navier-Stokes and energy equations for the air inside the cavity and the PCM layer was developed to examine the perturbation of the phase change on heat transfer at the PCM/air interface. The results showed a notable disagreement between the calculated and measured temperature in the cavity and PCM, when the density change during the solidification process has not

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