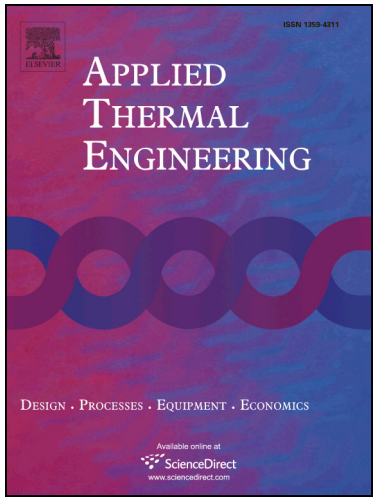

Research Paper

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Seyed Ebrahim Ghasemi, Ali Akbar Ranjbar

PII: S1359-4311(17)31547-8
DOI: http://dx.doi.org/10.1016/j.applthermaleng.2017.03.021
Reference: ATE 10023

To appear in: *Applied Thermal Engineering*

Received Date: 30 May 2016
Revised Date: 29 January 2017
Accepted Date: 6 March 2017

Please cite this article as: S. Ebrahim Ghasemi, A. Akbar Ranjbar, Numerical Thermal Study on Effect of Porous Rings on Performance of Solar Parabolic Trough Collector, *Applied Thermal Engineering* (2017), doi: http://dx.doi.org/10.1016/j.applthermaleng.2017.03.021

Numerical Thermal Study on Effect of Porous Rings on Performance of Solar Parabolic Trough Collector

Seyed Ebrahim Ghasemi [*], Ali Akbar Ranjbar

Department of Mechanical Engineering, Babol University of Technology, Babol, Iran

Abstract

In this article, three dimensional turbulent flow for Syltherm heat transfer fluid in absorber tube of solar system with turbulators is simulated. The thermo-hydraulic characteristics of solar parabolic trough collector with porous rings are investigated numerically. The numerical simulation is implemented by using Computational Fluid Dynamics (CFD). The impact of distance between rings and the inner diameter of the rings on the thermal performance of the collector are evaluated. The heat transfer fluid is Syltherm 800 and the analysis is carried out based on Re-Normalization-Group (RNG) k–ε turbulent model. The results show that the heat transfer characteristics of solar parabolic trough collector enhances by inserting the porous rings in tubular solar absorber. Also, by decreasing the distance between porous rings, the heat transfer characteristic increases but by increasing the inner diameter of the porous rings, the Nusselt number reduces.

Keywords: Thermal study, Solar parabolic trough collector, Porous ring, RNG k–ε model, Syltherm 800.

1. Introduction

[*] Corresponding author:

E-mail: s.ebrahim.ghasemi@stu.nit.ac.ir