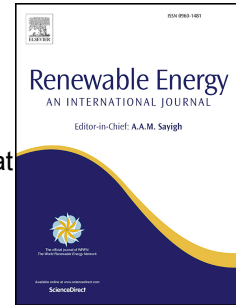


Accepted Manuscript

Influence of non-uniform heat flux distributions on the secondary flow, convective heat transfer and friction factors for a parabolic trough solar collector type absorber tube

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PII: S0960-1481(17)30139-8

DOI: [10.1016/j.renene.2017.02.053](https://doi.org/10.1016/j.renene.2017.02.053)

Reference: RENE 8560

To appear in: *Renewable Energy*

Received Date: 31 December 2016

Accepted Date: 19 February 2017

Please cite this article as: Okafor IF, Dirker J, Meyer JP, Influence of non-uniform heat flux distributions on the secondary flow, convective heat transfer and friction factors for a parabolic trough solar collector type absorber tube, *Renewable Energy* (2017), doi: 10.1016/j.renene.2017.02.053.

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1 **Influence of Non-Uniform Heat Flux Distributions on the**
2 **Secondary flow, Convective Heat Transfer and Friction Factors**
3 **For a Parabolic Trough Solar Collector Type Absorber Tube**

4
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15
16 **Abstract**

17 Non-uniform heat flux profiles on circular tubes are found in a number of heat transfer
18 applications, including solar heating. In this numerical study the influence of the
19 circumferential angle spans of non-uniform heat flux distributions are considered on the
20 secondary buoyancy-driven flow, internal fluid heat transfer coefficients, and friction factors
21 in horizontal absorber tubes in parabolic trough solar collector applications for water heating
22 in the laminar flow regime. Inlet Reynolds numbers ranging from 130 to 2200 for 10 m long
23 tubes with different inner diameters were considered. Sinusoidal type incident heat flux
24 distributions, tube-wall heat conduction and heat losses were taken into account. It was found
25 that due to buoyancy-driven secondary flow, overall and local internal heat transfer
26 coefficients were increased significantly due to the non-uniformity of the incident heat flux.

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