UNIVERSITAS KRISTEN PETRA

Ekadewi Handoyo <ekadewi@petra.ac.id>

International Journal of Green Energy - Invitation to review Manuscript ID IJGE-2016-0011
1 message

x6li@mecheng1.uwaterloo.ca <x6li@mecheng1.uwaterloo.ca> Mon, Apr 25, 2016 at 7:42 AM
To: ekadewi@peter.petra.ac.id

24-Apr-2016

Dear Dr Ekadewi A. Handoyo:

The above manuscript, entitled "Performance improvement of a double-pass V-corrugated solar air heater under recycling operation" with Dr Ho as contact author has been submitted to International Journal of Green Energy.

I would be grateful if you would kindly agree to act as a reviewer for this paper. The abstract appears at the end of this letter, along with the names of the authors.

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Sincerely,
Dr Li
International Journal of Green Energy Editorial Office
x6li@mecheng1.uwaterloo.ca, x6li@mecheng1.uwaterloo.ca

MANUSCRIPT DETAILS

TITLE: Performance improvement of a double-pass V-corrugated
solar air heater under recycling operation

AUTHORS: Ho, Chii-Dong; Tien, Yi-En; Chang, Hsung

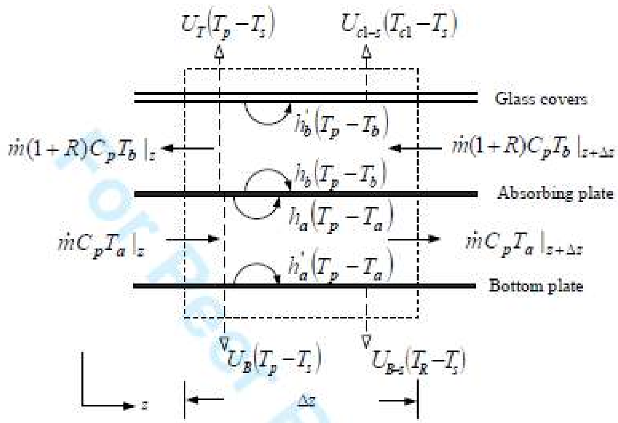
ABSTRACT: The device performance of double-pass V-corrugated solar air heaters with external recycle was investigated experimentally and theoretically. The comparison between V-corrugated and flat-plate collectors was made to show the thermal efficiency improvement with various operating parameters. The results show that the collector efficiency improvement of the recycling double-pass V-corrugated operation is much higher than those of the other configurations under various recycle ratios and mass flow rates. However, there exists the penalty on the power consumption increment due to implementing V-corrugated channel into the solar air heaters, an economic consideration on both the heat-transfer efficiency enhancement and power consumption increment for the double-pass V-corrugated device was also delineated. The experimental setup was carried out to validate the theoretical predictions, and the fairly good agreement between both results was achieved with the error analysis of 0.48-1.83%.

Performance improvement of a double-pass V-corrugated solar air heater under recycling operation

1. It will be interesting if you compare the results with other researchers' result, such as with paper of:
   a. Sunil Chamoli, Ranchan Chauhan, N.S. Thakur, and J.S. Saini which title: "A review of the performance of double pass solar air heater"
   b. Ho-Ming Yeh, Chii-Dong Ho which title: "Effect of external recycle on the performances of flat-plate solar air heaters with internal fins attached"
   c. Ho-Ming Yeh, Chii-Dong Ho which title: "Solar air heaters with external recycle"
   d. B.M. Ramani, Akhilesh Gupta, Ravi Kumar which title: "Performance of a double pass solar air collector"

2. Is schematic drawing in Fig. 1 similar to Fig. 3? They seem not the same.

3. The schematic of energy balance in Fig. 2 could mislead readers.



For mass flow rate, $\dot{m}$: it looks like that the mass flow rate at the inlet is "$\dot{m}$" and it is increasing to be "$\dot{m}(1+R)$" on the outlet. It might give impression that conservation of mass is violated.

4. In Fig. 2: overall heat transfer coefficient, U_B $(T_p - T_s)$ calculate heat transfer from absorbing plate to lower channel flow and conduction through bottom plate and convection to the surrounding. While $U_{B\text{-}s}$ $(T_R - T_s)$ calculate heat transfer from bottom plate to the surrounding. Then, it means that heat transfer from bottom plate to surrounding is counted twice. It needs correction.

   Further, in Equation (20) you describe how to find U_B. In this Eq., you just deal with conduction heat transfer from bottom plate. You need to make the correction regarding these coefficient.
   In your paper, you have not explained how to define $U_{B\text{-}s}$.

5. In Fig. 2: overall heat transfer coefficient, U_T $(T_p - T_s)$ calculate heat transfer from absorbing plate to upper channel flow and conduction through glass cover and convection to the surrounding. While $U_{C1\text{-}s}$ $(T_{C1} - T_s)$ calculate heat transfer from glass cover to the surrounding. Then, it means that heat transfer from glass cover to surrounding is counted twice. It needs correction.

6. In Page 3, Line 35-38: the assumptions were: temperatures of the absorber plate, bottom plate and air streams are functions of the flow direction only (in this case: functions of *z*). But in Eq. (1) until Eq. (5), the absorber plate, T_p or bottom plate, T_R, seems constant, not function of *z.*
   Does it mean that all of your Equations need correction?

7. In Page 4, Line 34-37: the temperature distribution of the flowing air in dimensionless form as shown in Eq. (8), (9), and (10). Is it true that Eq. (8), (9), and (10) are dimensionless?

From Appendix, Eq. (A1) until Eq. (A6), the B_is are having dimension [L^{-1}]. The Y_is, I_is, and H_is are having the same dimension with B_is, i.e. [L^{-1}] from Eq. (A14) – Eq. (A15), Eq. (A21) – Eq. (A24). From Eq. (A7) until Eq. (A13), some G_is are dimensionless, but some (i.e. G_4 and G_7) are having dimension. I think some terms in Eq. (8), (9), and (10) are not consistent: some are dimensionless, but some has dimension (but not temperature). Please check again to make sure that Eq. (8), (9), and (10) are really dimensionless.

8. In page 9 line 25 – 26, the velocity used is only one value, i.e. 1.0 m/s, but there are three mass flow rates, i.e. 0.0107, 0.0161, and 0.0214 kg/s. How to get three mass flow rates with one velocity?

9. In Eq. (32), there is "$\text{efficiency}_{theo,i}$", how to calculate or get it?

10. In page 11 line 15 and numbers in Table 3, are they in percentage? Is it 0.48% or 0.48 = 48%?

UNIVERSITAS KRISTEN PETRA

Ekadewi Handoyo <ekadewi@petra.ac.id>

Thank you for submitting your review of Manuscript ID IJGE-2016-0011 for International Journal of Green Energy

1 message

x6li@mecheng1.uwaterloo.ca <x6li@mecheng1.uwaterloo.ca> Thu, May 26, 2016 at 9:32 AM
To: ekadewi@peter.petra.ac.id

25-May-2016

Dear Dr Ekadewi A. Handoyo:

Thank you for reviewing the above manuscript, entitled "Performance improvement of a double-pass V-corrugated solar air heater under recycling operation" for International Journal of Green Energy.

We greatly appreciate the voluntary contribution that each reviewer gives to the Journal. We hope that we may continue to seek your assistance with the refereeing process for International Journal of Green Energy, and hope also to receive your own research papers that are appropriate to our aims and scope.

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International Journal of Green Energy - Invitation to review Manuscript ID IJGE-2016-0011.R1

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International Journal of Green Energy <onbehalfof+x6li+mecheng1.uwaterloo.ca@manuscriptcentral.com> Mon, Oct 24, 2016 at 10:00 PM
Reply-To: x6li@mecheng1.uwaterloo.ca
To: ekadewi@peter.petra.ac.id

24-Oct-2016

Dear Dr Ekadewi A. Handoyo:

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AUTHORS: Ho, Chii-Dong; Tien, Yi-En; Hsiao, Ching-Fang

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among different designs of V-corrugated, baffled and fins attached and flat-plate collectors was made to show the device performance improvement with various operating parameters under the same working dimensions. The recycling double-pass V-corrugated device developed here was proposed in aiming to strengthen the convective heat-transfer coefficient and enlarge the heat transfer area. The error analysis of experimental results deviate by 0.85-2.46% from the theoretical predictions with the fairly good agreement, and both results show that the device performance of the recycling double-pass V-corrugated operation is better than those of the other configurations under various recycle ratios and mass flow rates. The suitable selections were obtained for operating recycling double-pass V-corrugated devices while considering with an economic viewpoint by both the collector efficiency enhancement and power consumption increment.

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Manuscript Details

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Manuscript Type: Regular Paper

Keywords: solar air heater, V-corrugated device, Heat transfer efficiency improvement, Power consumption increment, Recycling double-pass operation

Date Submitted: 12-Aug-2016

Manuscript Title: The influences of recycle effect on double-pass V-corrugated solar air heaters

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Recommendation

Accept

✓ Minor Revision

Major Revision

Reject & Resubmit

Reject

Would you be willing to review a revision of this manuscript?

✓ Yes

No

Comments

Confidential Comments to the Editors

It is an interesting topic, but needs more clarification on some part of the paper.

Comments to the Author

1. It will be interesting if you compare the results with other researchers' result, such as with paper of:
a. Sunil Chamoli, Ranchan Chauhan, N.S. Thakur, and J.S. Saini which title: "A review of the performance of double pass solar air heater"
b. Ho, C.D., Yeh, C.W. and S.M. Hsieh which title: "Improvement in device performance of multi-pass flat-plate solar air heaters with external recycle"
c. Ho, C.D., Chang, H., Wang, R.C. and C.S. Lin which title: "Analytical and experimental studies of recyclic baffled double-pass solar air heaters with attached fins"
d. Ho, C.D., Yi-En Tien, Y.E. and H. Chang which title: "Performance improvement of a double-pass V-corrugated solar air heater under recycling operation"
e. Ho-Ming Yeh, Chii-Dong Ho which title: "Effect of external recycle on the performances of flat-plate solar air heaters with internal fins attached"
f. Ho-Ming Yeh, Chii-Dong Ho which title: "Solar air heaters with external recycle"
g. B.M. Ramani, Akhilesh Gupta, Ravi Kumar which title: "Performance of a double pass solar air collector"

2. Is the configuration of SAH shown in Fig. 1 the same with schematic shown in Fig. 2? It will be better if some data like L, W, Hg, and Hv could be shown in Figure.
3. In Fig. 2, there is valve used and indicated with J. What kind of valve is used?
4. In Table 2, the error calculated is for what kind of efficiency? "eff_D" or "eff_V" or "eff_F" or "eff_S"?
5. In Section 4.1, you mention about "eff_D" or "eff_V" or "eff_F" and "eff_S" without any information before that you also investigate these SAHs.
6. What is R actually? In Section 2 or Section 4 it is Recycle Ratio, but in Nomenclature, it is Reflux Ratio. How do you define R? How it could be more than 1?
7. It will be better if you could draw the thermal resistance network to understand Eq (2) until Eq (6).
8. What is the difference between UB and UB-s?
9. Is the mass flow rate used in Eq (5) or Eq (6) right? Looks like they are swapped. In Eq (5), the mass flow rate for flow under the V-corrugated absorbing plate is "m(1+R)", isn't it?
10. How do you get the boundary conditions of Ta,0 in Eq (7)?
11. Are the temperature distribution in Eq (9) and Eq (10) dimensionless? The axial fluid temperature distribution in the lower and upper subchannel in Nomenclature have units (K) and term Ts looks like not dimensionless. So, the terms in Eq (9) and (10) are not having the same dimension.
12. What is "y" in Eq (20)?
13. How do you get radiation coefficient, hr, between absorber plate and cover glass 1?
14. How do you get the hydarulic diameter for flow in lower and upper subchannel?
15. Is Fig. 6 for the same V-corrugated absorbing plate?
16. In page 9, line 21, it is written that Fig 6 illustrates the graphical representation for comparisons with some experimental results and theoretical predictions obtained in our previous work..... In Fig 6, which one is experimental and which one is theoretical?
17. It would be interesting if there is an elaborate analyzis on Fig 7 where the value of efficiency-improvement ratio for V-corrugated SAH is less than Fins+Baffles SAH for small mass flow rate.

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International Journal of Green Energy <onbehalfof+x6li+mecheng1.uwaterloo.ca@manuscriptcentral.com> Tue, Nov 22, 2016 at 3:40 PM
Reply-To: x6li@mecheng1.uwaterloo.ca
To: ekadewi@peter.petra.ac.id

22-Nov-2016

Dear Dr Ekadewi A. Handoyo:

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International Journal of Green Energy >
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Original Articles

The influences of recycle effect on double-pass V-corrugated solar air heaters

Chii-Dong Ho, Yi-En Tien & Ching-Fang Hsiao

Pages 1083-1092 | Published online: 13 Oct 2017

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ABSTRACT

The study of the heat transfer enhancement for the recycling double-pass V-corrugated solar air heaters, which implement the external recycle of flowing air, was investigated experimentally and theoretically. The comparison among different designs of V-corrugated, baffled and fins attached, and flat-plate collectors was made to show the device performance improvement with various operating parameters under the same working dimensions. The recycling double-pass V-corrugated device developed here was proposed in aiming to strengthen the convective heat-transfer coefficient and enlarge the heat transfer area. The error analysis of experimental results deviate by 0.85–2.46% from the theoretical predictions with the fairly good agreement, and both results show that the device performance of the recycling double-pass V-corrugated operation is better than those of the other configurations under various recycle ratios and mass flow rates. The suitable selections were obtained for operating recycling double-pass V-corrugated devices while considering

with an economic viewpoint by both the collector efficiency enhancement and the power consumption increment.

V-corrugated device

Funding

The authors wish to thank the Ministry of Science and Technology of the Republic of China for the financial support.

Nomenclature

	surface area of the absorbing plate ()
	specific heat of air at constant pressure (J/kgK)
	equivalent diameter of the channel (m)
	further improvement of collector efficiency
	the accuracy of the experimental results, Eq. (14)
f	a correlation parameter defined in Eq. (20)

H_v	hypotenuse length of V-corrugated absorber (m)
h	convective heat-transfer coefficient for fluid flowing over the plate of duct ()
	radiation heat-transfer coefficient between absorber plate and cover 1
	radiation heat-transfer coefficient between absorber plate and bottom plate
	convective feat-transfer coefficient between glass cover and ambient ()
	improvement of collector efficiency of the flat-plate device, Eq. (15)
	improvement of collector efficiency of the baffled and fins attached device, Eq. (16)
	improvement of collector efficiency of the baffled and fins attached device, Eq. (16)
	improvement of collector efficiency of the V-corrugated device, Eq. (18)
	power consumption increment of double-pass solar air collector device, Eq. (26)
	power consumption increment of baffled solar air collector with fins attached device, Eq. (27)
	power consumption increment of V-corrugated solar air collector device, Eq. (25)

k	thermal conductivity of the stainless steel plate ()
k_s	thermal conductivity of insulator ()
k_B	thermal conductivity of the bottom plate ()
L	collector length (*m*)
l_s	thickness of insulator (*m*)
l_B	thickness of the bottom plate (*m*)
	friction loss (*J/kg*)
	air mass flow rate (*kg/s*)
Nu	Nusselt number
	useful gain of energy carried away by air per unit time (J/s), Eq. (1)
P_V	power consumption of the double-pass V-corrugated air heater (J/s), Eq. (20)
P_S	power consumption of downward-type single-pass device (J/s), Eq. (19)

Re	Reynolds number of flow channel
T	temperature (K)
T_{in}	inlet temperature (K)
$T_{a,0}$	the temperature of the subchannel a at x=0 (K)
$T_{a,L}$	the temperature of the subchannel a at x=L (K)
$T_{b,0}$	the temperature of the subchannel b at x=0 (K), Eq. (11)
$T_{b,L}$	the temperature of the subchannel b at x=L (K)
	axial fluid temperature distribution in the lower subchannel (K), Eq. (10)
	axial fluid temperature distribution in the upper subchannel (K), Eq. (9)
	mean temperature of absorbing plate (K), Eq. (13)
	heat loss coefficient from the bottom of solar collector to the ambient ()
	heat loss coefficient from the bottom of solar collector to the ambient environment ()

	overall loss coefficient ()
	loss coefficient from the top of solar collector to the ambient environment ()
V	wind velocity (m/s)
	average air velocity in the flow channel (m/s)
W	the width of absorber surface area (m)
y	a correlation parameter defined in Eq. (21)
z	axis along the flow direction (m)

Greek Letters

	absorptivity of the absorbing plate
	collector efficiency of double-pass flat-plate solar air heater
	collector efficiency of double-pass baffled solar air heater with fins attached
	collector efficiency of downward-type single-pass solar air heater

	collector efficiency of V-corrugated solar air heater, Eq. (12)
	emissivity of glass cover
	emissivity of absorbing plate
	emissivity of bottom plate
	transmittance of glass cover
	the Stefan-Boltzmann constant ()
	dimensionless channel length

Subscripts

a	the lower subchannel
b	the upper subchannel
c1	inner glass cover
c2	outer glass cover

i	inlet
m	mean value
o	outlet at the upper subchannel (z=0)
p	
R	absorber plate

bottom plate

S	downward-type single-pass device
s	surrounding
V	V-corrugated device
W	Wire mesh device

Additional information

Funding

The authors wish to thank the Ministry of Science and Technology of the Republic of China for

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