Computational Simulation of Modeling Analysis and Its Performance and Design Parameters of V ARC Ribs Patterns Arrays Having on SAH Plates.

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Abstract— To analysis the design of V rib arrays pattern having on SAH plate for W/w=2 and e/w= and e/W= 0.013 and p/e=24, etc. These values have calculated and analyze by computationally with different phases and get new results to verify. To investigate numerically match with experimentally data to execute design parameter for arrays on duct as given dimension, mentioned in specification. We have to get high efficiency with compactable SAH as well their plate design arrays too, so V-type arrays pattern will be Vital role and with good performance to analyzed. The phases of computational analysis done with V-type with pick to these design values have verified. To check its design performances such as Temperature, pressure and turbulence contour, Density contour through which it's done. As acquire Reynolds no., its k-omega range of turbulence to compute data to design parameter to perform better thermal efficiency to get better performance. Analysis will have to achieve to better performance result to get better acquire experimental result.

Keywords: Cfd for v-type, SAH of v-rib

I. INTRODUCTION

To investigate of arrays of double arc rib on rectangular duct with different design parameter with design specification to get better efficiency and thermal efficiency for that get best result for better computational analysis to get better rip pattern results.

Solar energy is one of the environmentally compatible sources of renewable energy. It is most recognized as one of the promises that can conserve the Earth to survive in a reasonable shape. Solar energy is virtually unlimited. The Sun is the primary source of renewable energy and it harvest more abundant than any other type of energy. A conventional solar air heater generally consists of an absorber plate with a parallel plate below forming a passage of high aspect ratio through which the air to be heated flows. As in the case of the liquid flat-plate collector, a transparent cover system is provided above the absorber plate, while a sheet metal container filled with insulation is 'provided on the bottom and sides. Cfd analysis as numerically for V-type subtracted rib arrays on duct with respected geometry with various angles of attack with help of various contour of turbulent, pressure. Temperature etc.

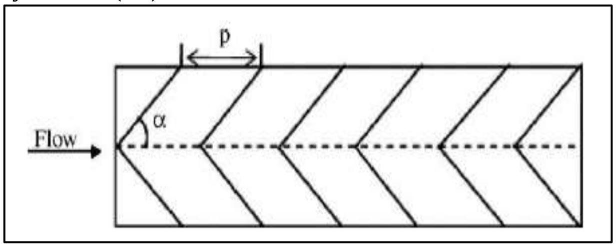
II. LITERATURE REVIEW

We study more ever single arc and double arc paper we done as per convention design with help of our result as CFD analysis for pre processing as final one post processing. That a reason we got unique results. Mention as meshing and final one as follows.

So we can form the problem formulation that's the reason done wide width and increase as e values too as compare the relative one classical research says that a our objectives meets.

A. Specification of Design

Length(W)	= 220 mm
Breath(L)	= 650 mm
Thickness	= 20 mm
Hydralic Diameter(D)	= 45.12 mm
Rib height(e)	= 3.0 mm
Rib pitch(P)	= 72.22 mm
Angle (α)	= 20°, 35°, 40°
Reynold no.(Re)	= 4000-9000



B. Geometry & Meshing

The V arc shape geometry dawn in CAD software as per in specification design as mentioned as follows:

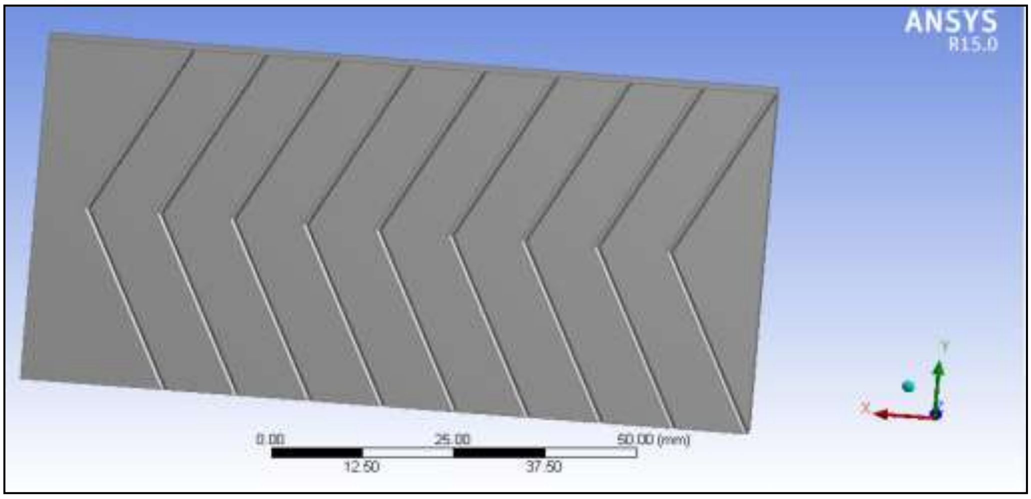


Fig. 1: Geometry of V arc plate of SAH

After modeling, we have meshing the model so next process of numerical method. Mesh as global mesh has written in meshing detail.

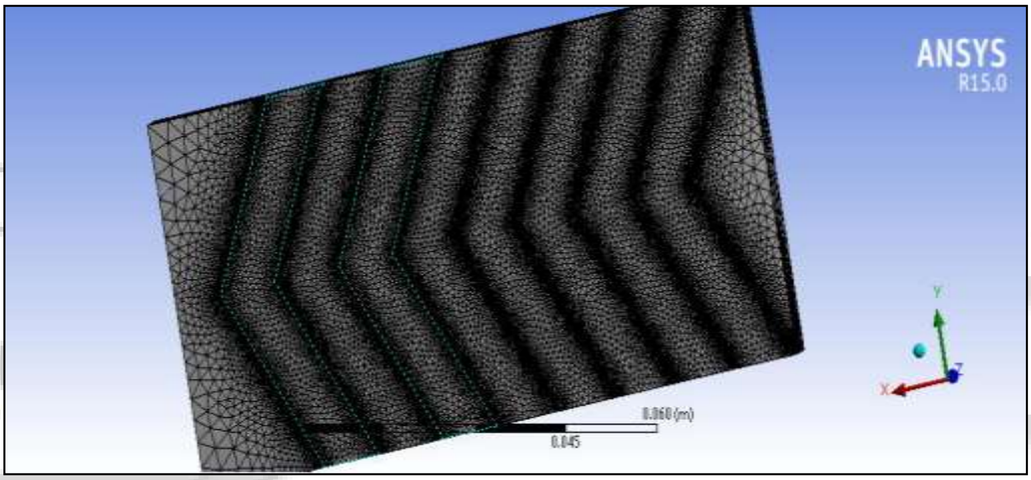


Fig. 2: Mesh of Model

Meshing detail

Type of element	Tetrahedral
No. of nodes	524011
No. of Elements	274181

III. BOUNDARY CONDITION

At Inlet

Condition	Value
Pressure	0.2 bar
Temperature	320 k
Velocity(m/s)	0.3 m/s
Turbulent model	K-omega
Density of fluid on duct	1.225 kg/m^3
Turbulent intensity	5%

At Outlet

Condition	Value
Pressure	0.4 bar
Temperature	400 k
Velocity(m/s)	0.6 m/s
Turbulent model	K-omega
Turbulent intensity	5 %
Wall	Segmental flow region
Wall	No slip condition

IV. RESULT & DISCUSSION

The improvement in their performance has been and is still of major concern to theorists and practitioners. The issue of exchanging heat between the calporting fluid (air) and the absorber within a solar collector relies mainly on the value of the heat transfer coefficient. This coefficient is a mine of factors that affect the heat exchange between working fluid and heated surfaces. Therefore, it is an ambitious attempt to work on such a topic. In this study, we reviewed the different configurations of flat plate solar air collectors by highlighting three main groups: single-pass solar air collectors, double-pass solar air collectors, and multi-pass solar air collectors. We showed the various parameters in the design of solar energy collectors on which it is possible to act to enhance the thermal transfer phenomenon between the cal porting air and the absorber-plate, and thus to favor the energetic efficiency while assuring an optimal temperature augmentation. The investigations on different models and configurations with various heat transfer enhancement strategies of solar energy collectors were shown in various stages, i.e., modeling, control, measurement, and visualization of field or flow of air, determination of the heat transfer, control of friction loss and pressure drop, and evaluation of the thermal performance by the measurement of the augmentation in the temperature of the working fluid so our designed get done. There is a contour called turbulent contour, temperature contour, pressure contour, density contour.

From Turbulent contour if tubulency increase best option will opt as same as pressure and temperature contour too bu density is reverse so that iteration graph has got accordingly converse all thermal parameter.

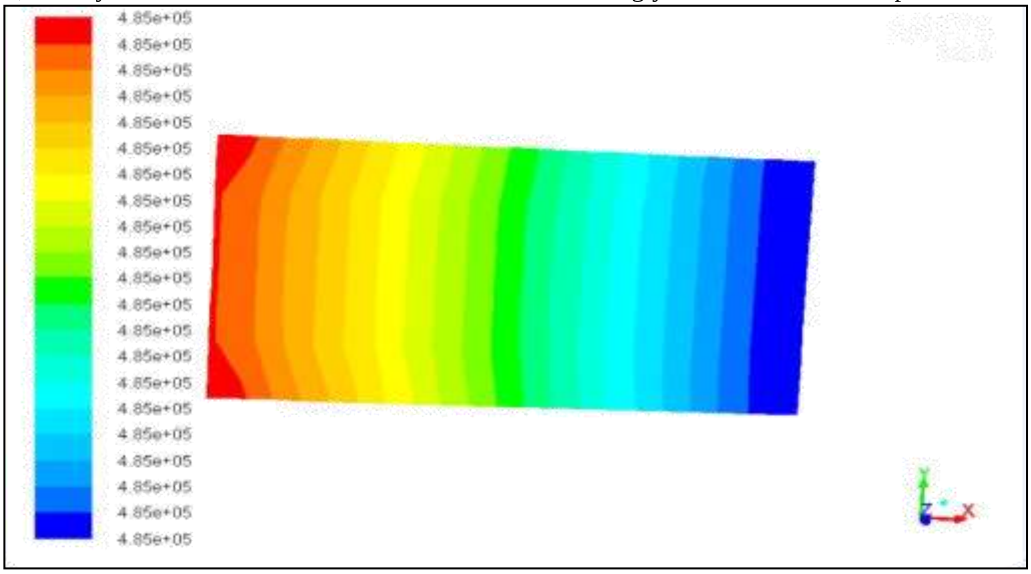


Fig. 3: Turbulent contour

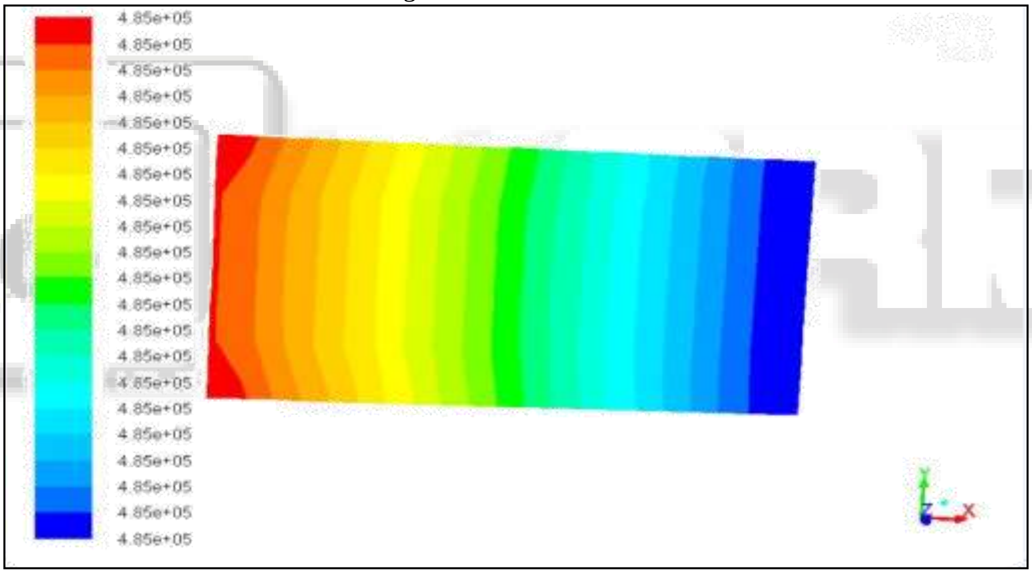


Fig. 4: Temperature contour

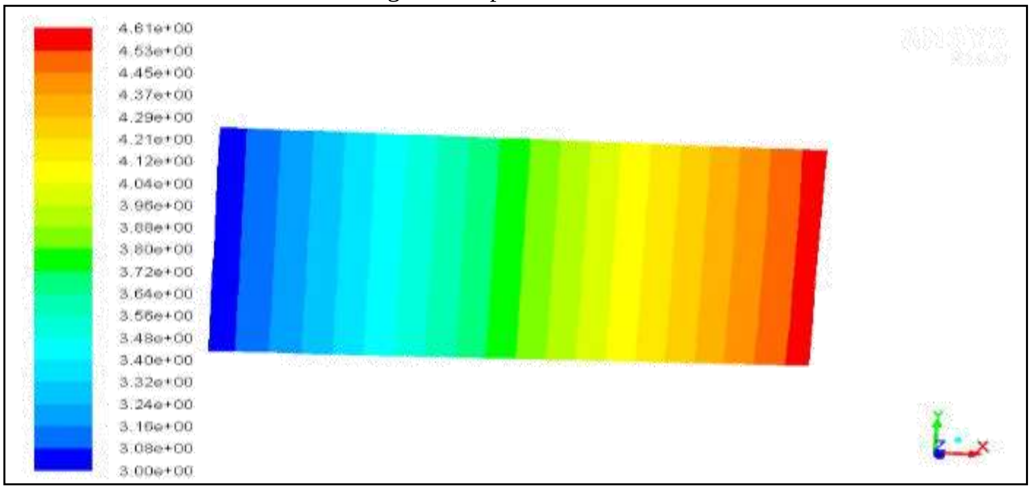


Fig. 5: Pressure contour

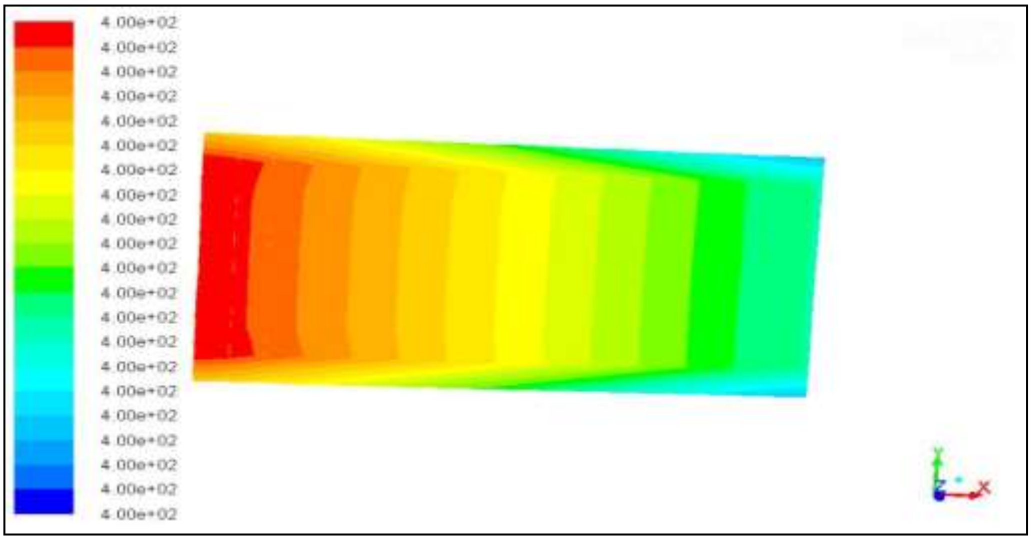


Fig. 6: Density contour

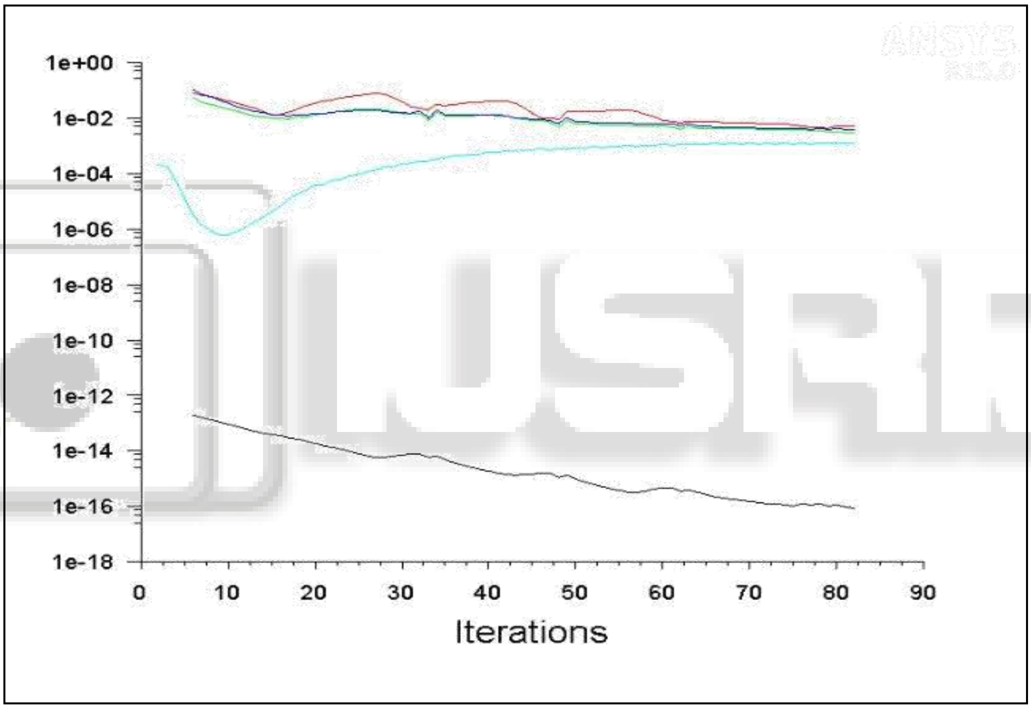


Fig. 7: Result graph

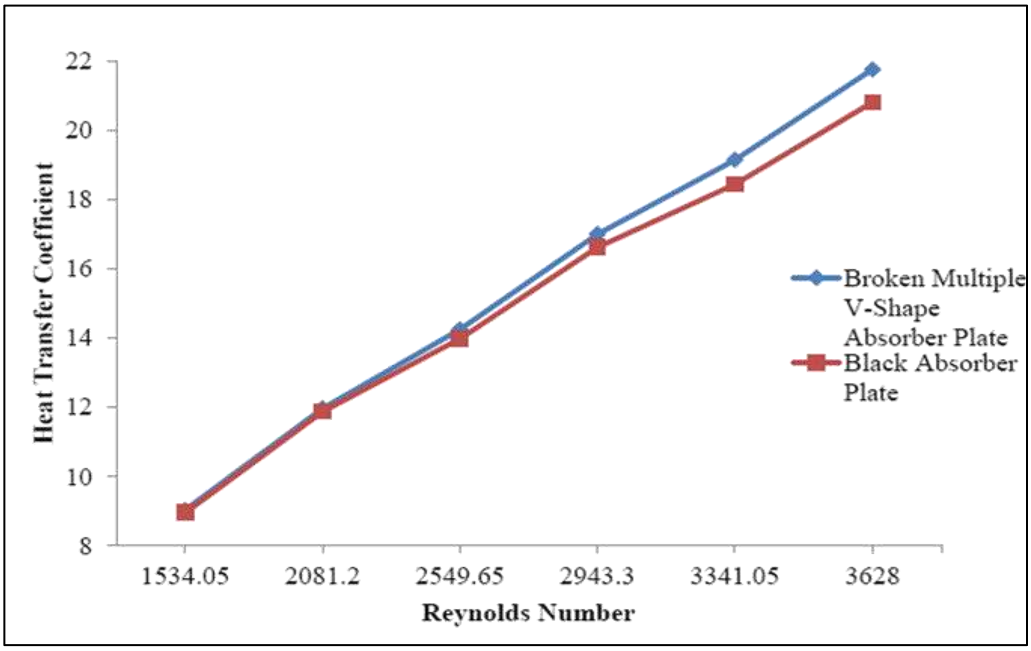


Fig. 8: Variations in Heat Transfer Coefficient with Reynolds Number for different Absorber plate

Its shows that heat transfer coefficient increases with increase in Reynolds Number for different absorber plates. The value of heat transfer coefficient increase with increasing roughness on the absorber plate surface for hike in Reynolds number. Lower value of heat transfer coefficient has been found for black absorber plate as compared to that of broken V-shaped baffle absorber plate. The whole sole difference in heat transfer coefficient can be achieved with increase in turbulence due to roughness of the plate.

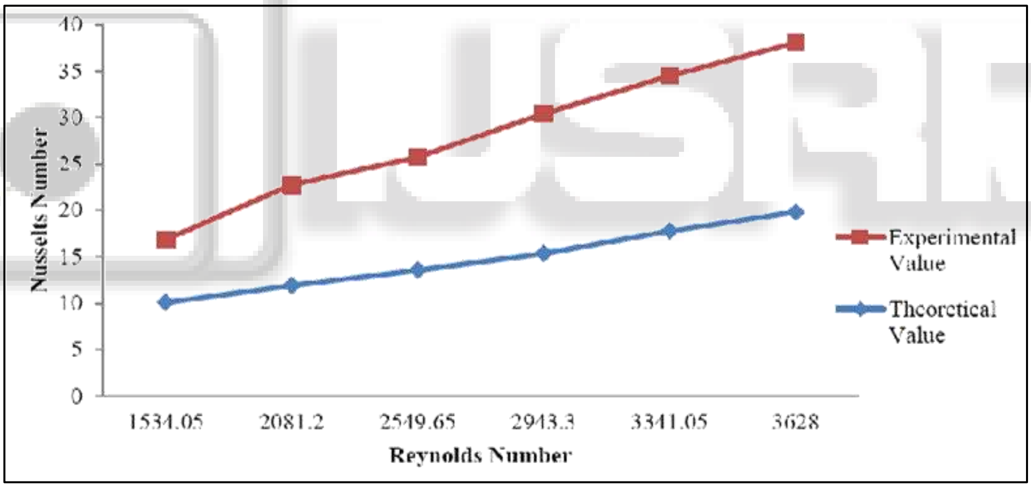


Fig. 9: Variation in theoretical to experimental Nusselt Number for different absorber plate

Shows that Nusselt number agrees reasonably well with the values predicted. As the experimental values for Nusselt number is in reasonably good agreement with predicted values, the validity of the experimental results is ensured. The results shows similar trend as the results obtained by researcher. Nusselts Number increases with increase in Reynolds Number for both absorber plates. The reason for increase in Nusselts Number for both absorber plates is increase in heat content and high temperature of working fluid.

V. Conclusion

The Numerical investigations were conducted on solar air heater duct roughened with broken double arc shaped ribs. The staggered rib piece was fixed at a distance of the main arc rib pitch on the downstream side of gap. The following conclusions are drawn from the present study:

A 2-dimensional of arrays pattern CFD analysis has been carried out to study heat transfer and fluid flow behavior in a rectangular duct of a solar air heater with one roughened wall having rectangular and broken double arc-rib roughness. The effect of Reynolds number on the heat transfer coefficient and friction factor have been studied. In order to validate the present numerical model, results have been compared with available experimental results under similar flow conditions. CFD Investigation has been carried out in medium Reynolds number flow (Re = 4000–9,000). And all physical and thermodynamic properties have studied.

Before analysis of CFD we knew that as experimental says to v-type rib was excellent performance so we got better efficiency after getting result so.

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