CFD Analysis of SAH on Duct Subtracted Double Arc Pattern Array of SAH Duct

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Abstract— Once we look for better efficiency, we look for internal mechanism to improve. The look after geometry part that gives better result to improvements so that, go for double arc subtracted on rectangular duct arrays to investigates cfd analysis for required some geometrical ratio such as W/w=1.9 and e/w=0.021 and e/W=0.11 and p/e=34.8, to improve efficiency and design and better analysis to get better result for that. Sometime analysis decided the geometry of devices such as solar air heater duct arrays pattern to create better performance due to less time to improve design with help of cfd analysis match with experimental result to get new prototype for better performance.

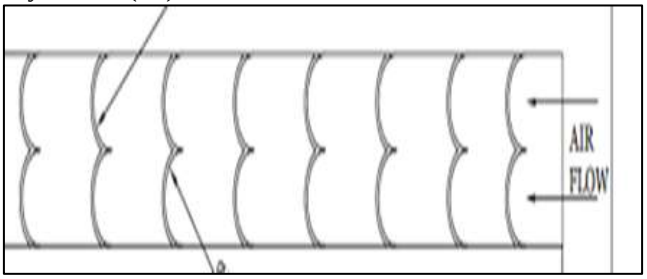
Keywords: CFD for Double Rib Arc, SAH, CFD of SAH

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.

II. SPECIFICATION OF DESIGN

Length(W) = 220 mm
Breath(L) = 750 mm
Thickness = 20 mm
Hydralic
Diameter(D) = 42.24 mm
Rib height(e) = 2.3 mm
Rib pitch(P) = 80 mm
Angle (α) = 20°, 35°, 40°
Reynold no.(Re) = 4000-8000



III. GEOMETRY & MESHING

The single arc geometry dawn in CAD software as follows

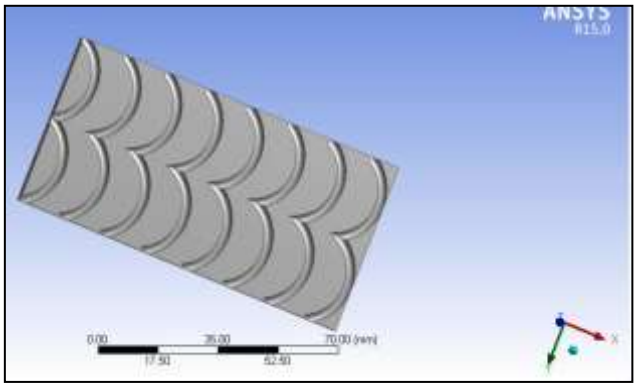


Fig. 1: Geometry of Single arc plate of SAH

After modeling, we have meshing the model so next process of numerical method.

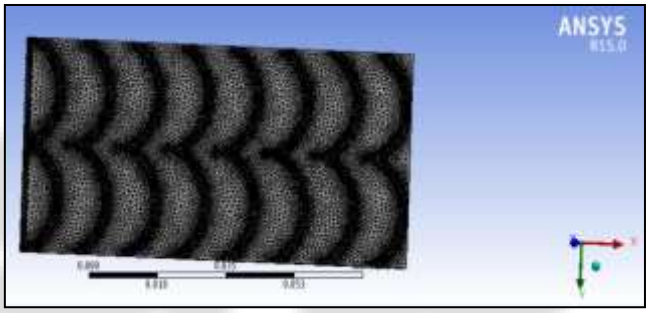


Fig. 2: Mesh of Model

Meshing detail

Type of element	Tetrahedral
No. of nodes	612140
No. of Elements	383121

IV. BOUNDARY CONDITION

A. At Inlet

Condition	Value
Pressure	101325 pa
Temperature	320 k
Velocity(m/s)	0.2 m/s
Turbulent model	K-omega
Density of fluid on duct	1.225 kg/m3
Turbulent intensity	5%
Wall	Pre-defined

B. At Outlet

Condition	Value
Pressure	1 bar
Temperature	400 k
Velocity(m/s)	0.4 m/s
Turbulent model	K-omega
Turbulent intensity	5 %
Wall	Pre-defined
Wall	No slip condition

V. RESULT & DISCUSSION

Contour for turbulence for K-omega due to subtraction rib efficiency improved and uniform turbulent get better performance.

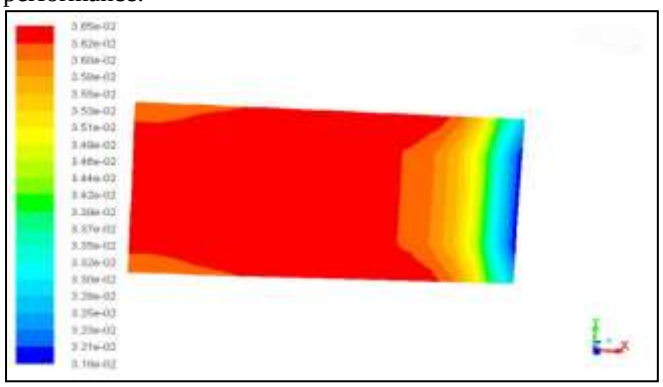


Fig. 3: Turbulent contour

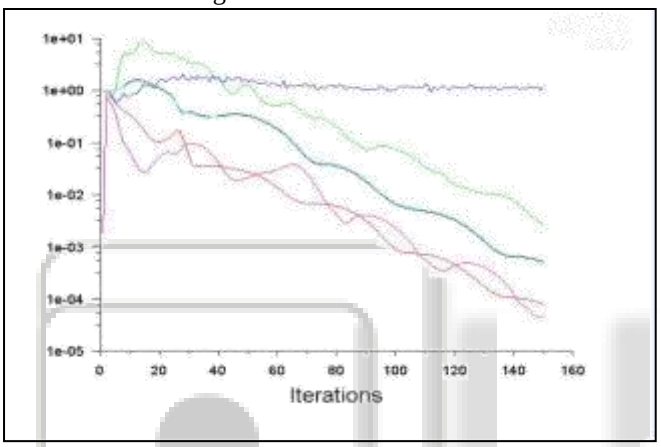


Fig. 4: Result graph

VI. CONCLUSION

By getting result contour of double arc verified to performance of thermal efficiency and tubulency to get better analysis.

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