MAE 598

Applied Computational Fluid Dynamics

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Project 2

Comment on collaboration: NO COLLABORATION



Task1 (1): plot of the mesh on the surface of the outlet.



Task1 (2) Contour plots of *temperature* and *velocity magnitude* on the surface of outlet.



velocity magnitude



Task1 (3) values of the averaged outlet temperature, Tout, and the energy flux at outlet, H



T_{out} = 312.3637 K

energy flux at outlet, H

Report Type	Field Variable	
Integral	Custom Field Functions	
Custom Vectors Vectors of	energy-flux-h	
Custom Vectors		- x
Save Output Parameter	routtow wall-fluid	
	Highlight Surfaces Integral	

H_{out} = 313369.4 W





Task2 (2) contour plots of *temperature* and *velocity magnitude* on the surface of outlet



Temperature contour (stretched pipe)



Velocity contour (straight pipe)



Velocity contour (stretched pipe)



contour-1 Velocity Magnitud T_{out}= 301.9908 K

Task2 (3) values of the averaged outlet temperature, Tout, and the energy flux at outlet, H

averaged outlet temperature (straight pipe)

Report Type	Field Variable
Area-Weighted Average	Temperature
Custom Vectors	Static Temperature
Vectors of	
Custom Vectors	inlet interior-fluid
Save Output Parameter	outflow
Sale supar analised	wall-fluid
	Highlight Surfaces
	Area-Weighted Average (k)
	301.9908

Report Type	Field Variable
Integral	Custom Field Functions
Custom Vectors Vectors of	energy-flux-h
Custom Vectors	inlet interior-fluid
Save Output Parameter	authow wall-fluid
	Highlight Surfaces Integral



Surface Integrals		× Surface Integrals	×
Report Type Area-Weighted Average	Field Variable	Report Type	Field Variable
Custom Vectors Vectors of Custom Vectors Save Output Parameter	Static Temperature Surfaces Filter Text inlet interior-fluid cutflow wall-fluid	Custom Vectors Vectors of Custom Vectors Save Output Parameter	surfaces Filter Text
Con	Highlight Surfaces Area-Weighted Average (k) 312.4496		Highlight Surfaces Integral -307704.6 Compute Write Close Help

Comparison

Case		T _{out} (K)	H _{out} (W)
1.	original pipe	312.3637	313369.4
2 (1).	Straight pipe	301.9908	305915
2 (2).	Stretched pipe	312.4496	307704.6

- It can be observed that the H_{out} decreases as the pipe tends to become straight.
- H_{out}(original) > H_{out}(Stretched) > H_{out}(Straight)
- T_{out}(original) is approximately equal to T_{out}(Stretched) but T_{out} (Straight) is the lowest.

energy flux (straight pipe)

Task 3: Line plots of velocity magnitude along four line segments in the plane of symmetry

This simulation was run on a full pipe



Appendix:

```
CODE For Task1
```

clc clear all

a = (10*pi)/100; t = [0:a:(10*pi)]; R = 0.2923; %0.3; C = 0.15/(2*pi); X = R*cos(t); Y = R*sin(t); Z = 3*C*t; plot3(X,Y,Z) fid = fopen('project2task2.txt','w'); id1=1; %r=sqrt((R^2)+(C^2))*t;
for id2=1:length(t)
 fprintf(fid,'%3i %3i %7.4f %7.4f %7.4f \n',id1,id2,X(id2),Y(id2),Z(id2))
end
fclose(fid);