

20.1.2016 HorizontalFin

Date

Mar 4, 2016 2:33:27 PM

Dear Jeff

I am enclosing the complete report for you which I had solved.

Also I am uploading the Paper which I am actually trying to Validate by COMSOL(Page 43, 45).

The Visualization is not as per the Paper enclosed .

Basically I am trying to separate the fin and cavity for the results, but I am solving NS equations for both fluid and the fin.

Thanking you

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1. Global Definitions
	1. Parameters 1

Parameters

| **Name** | **Expression** | **Description** |
| --- | --- | --- |
| Tc | 0 | Low Temperature |
| Th | 1 | High Temperature |
| Pr | 0.71 | Prandtl Number |
| p0 | 0 | Reference Pressure |
| Ra | 0 | Rayleigh Number |

1. Component 1 (comp1)
	1. Definitions
		1. Coordinate Systems
			1. Boundary System 1

|  |  |
| --- | --- |
| Coordinate system type | Boundary system |
| Identifier | sys1 |

* 1. Geometry 1



Geometry 1

Units

|  |  |
| --- | --- |
| Length unit | m |
| Angular unit | deg |

* 1. Heat Transfer in Fluids (ht)



Heat Transfer in Fluids

Features

|  |
| --- |
| Heat Transfer in Fluids 1: pressure=p0(as per Parameter), k=1, cp=Pr, Y=1, Density=1(all made dimensionless) |
| Thermal Insulation 1: Top wall and Bottom wall (as per paper) |
| Initial Values 1: Tc |
| Temperature 1: Wall 1 maintained at higher Temp Th |
| Temperature 2: Wall 9 maintained at lower Temp Tc |
| Heat Flux 1: h=1(heat transfer coefficient), external temp=Th(General inward flux) |
| Heat Flux 2, h=0 Tc |

* 1. Laminar Flow (spf)



Laminar Flow

Features

|  |
| --- |
| Fluid Properties 1:  |
| Wall 1: Left wall is maintained at Th wheras Right wall is maintained at TC |
| Initial Values 1: Initial Temperatute=Tc |
| Volume Force 1: (Ra/Pr) \*(T-Tc) considering The **Boussinesq** approximation  |
| Pressure Point Constraint 1: Upper right point(as per geometry pt:4) |

* 1. Heat Transfer in Solids 2 (ht2)



Heat Transfer in Solids 2

Features

|  |
| --- |
| Heat Transfer in Solids 1 |
| Thermal Insulation 1: All the walls of the Fin as per geometry defined |
| Initial Values 1: Maintained at cavity’s Temperature Tc |

* 1. Mesh 1



Mesh 1

1. Study 1
	1. Parametric Sweep

Parameter name: Ra

Parameters: 1e5, 1e6, 1e7

Stationary solver 1( Initial value based)

Stationary solver 1: Fully coupled

Method and Termination:

Non linear method: Automatic highly non linear

Initial damping factor: 1

Minimum Damping factor: 1E-4

Maximum No of Iterations: 25

Tolerance factor:1e-3

* 1. Stationary

Study settings

| **Property** | **Value** |
| --- | --- |
| Include geometric nonlinearity | Off |

Mesh selection

| **Geometry** | **Mesh** |
| --- | --- |
| Geometry 1 (geom1) | mesh1 |

Physics selection

| **Physics** | **Discretization** |
| --- | --- |
| Heat Transfer in Fluids (ht) | physics |
| Laminar Flow (spf) | physics |
| Heat Transfer in Solids 2 (ht2) | physics |

1. Results
	1. Data Sets
		1. Solution 1

Solution

| **Name** | **Value** |
| --- | --- |
| Solution | Solver 1 |
| Component | Save Point Geometry 1 |



Data set: Solution 1

* 1. Plot Groups
		1. Temperature (ht)



Surface: Temperature (K) Streamline: Total heat flux

* + 1. Isothermal Contours (ht)



Contour: Temperature (K) Arrow Surface: Total heat flux

* + 1. Velocity (spf)



Ra(1)=1e5 Surface: Velocity magnitude (m/s)

* + 1. Pressure (spf)



Ra(3)=1e7 Contour: Pressure (Pa)