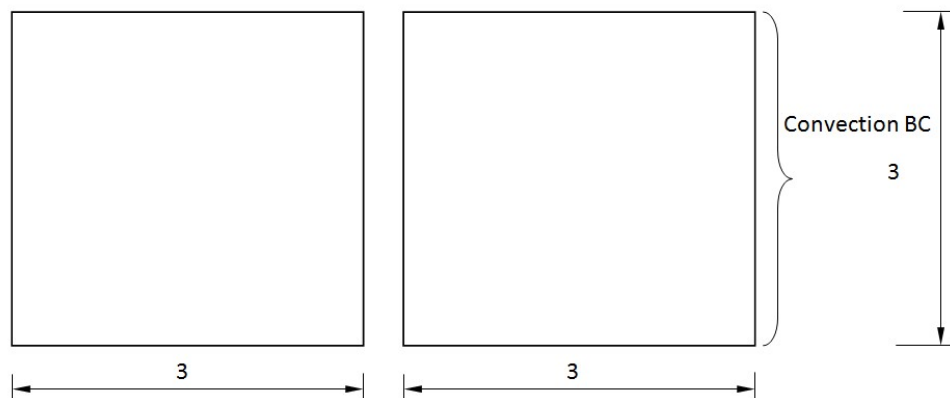




TRANSIENT HEAT TRANSFER ANALYSIS OF A CUBE WITH VARYING BOUNDARY CONDITION



All dimensions are in *m*

Description

Material properties

Thermal conductivity, $k = 121 \text{ W/mK}$

Specific heat, $C = 963 \text{ J/kgK}$

Mass density, $\rho = 2800 \text{ kg/m}^3$

Time	Convective film coefficient
1	12.82
2	26.63
3	39.9
4	53.32
5	67.26
6	82.27
7	99.28
8	120.2
9	150
10	207.7

Time	Ambient temperature
1	300.6
2	300.6
3	300.6
4	300.7
5	300.8
6	301
7	301.2
8	301.5
9	301.8
10	302.2



PROCEDURE

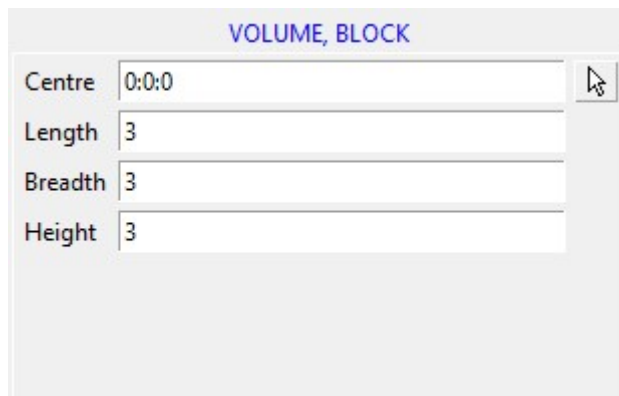
STEP

1 Create volume

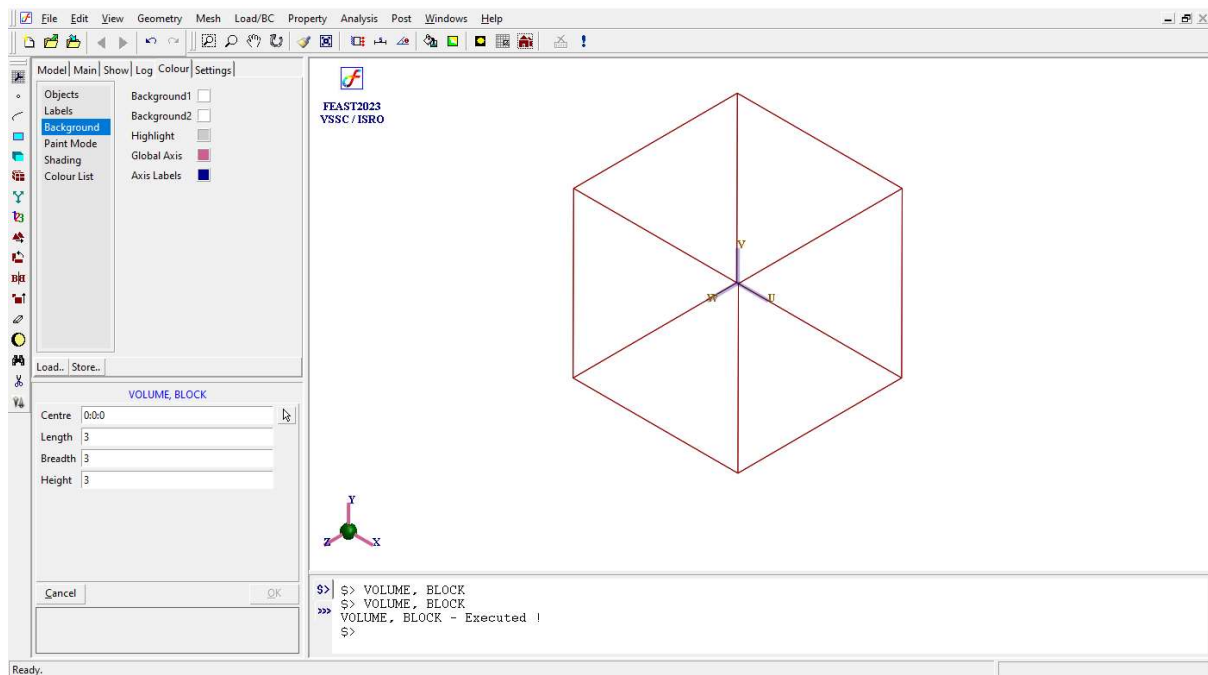
Menu : Geometry → Volume → Create → Block

Commands : VOLUME, BLOCK

Parameters : (To be filled by the user.)



At the end of the above operations, your screen should look like this.



2 Meshing the volume using Hexa element

Menu : Mesh → MeshGen → HEXA

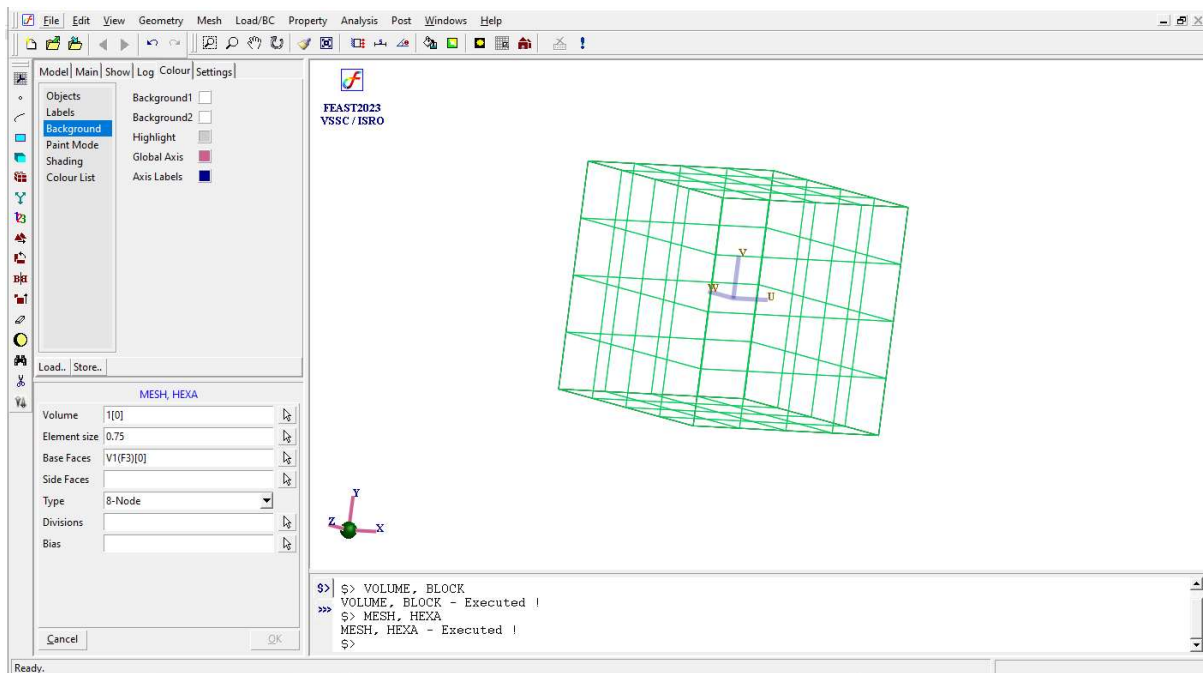
Command : MESH, HEXA



Parameters :

Volume	Use mouse to select the volume
ElemSize	0.75
Base Faces	V1(F3)[0] (Use mouse to pick a base face)
Side faces	V1(F2)[0] (Use mouse to pick a side face)
Type	8-node
Divisions	Click on the each edges to make it 4 divisions each

At the end of the above operations, your screen should look like this.



3 Set the analysis type

Menu : Analysis → Analysis Type

Command : ANTYPE,ADD

Analysis Type	HT Transient
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4 Input time varying boundary condition in tabular form

(i) Convective film coefficient

Menu : Property → Function → Scalar Table



Command : FUNCTION, TABSCALAR






















Set ID	1
Table Data	

Table			
1	12.82		
2	26.63		
3	39.9		
4	53.32		
5	67.26		
6	82.27		
7	99.28		
8	120.2		
9	150		
10	207.7		

Buttons: Add Row, Insert Row, Delete Row, Copy, Paste, From file..., Parameter Type: Time, No Extrapolation, Cancel, Apply

Parameters :1

(ii) Ambient temperature

Similarly create ambient temperature data table with Set ID



5 Specify heat transfer boundary conditions

(i) Convection

Menu : Load/BC → Thermal → Convection

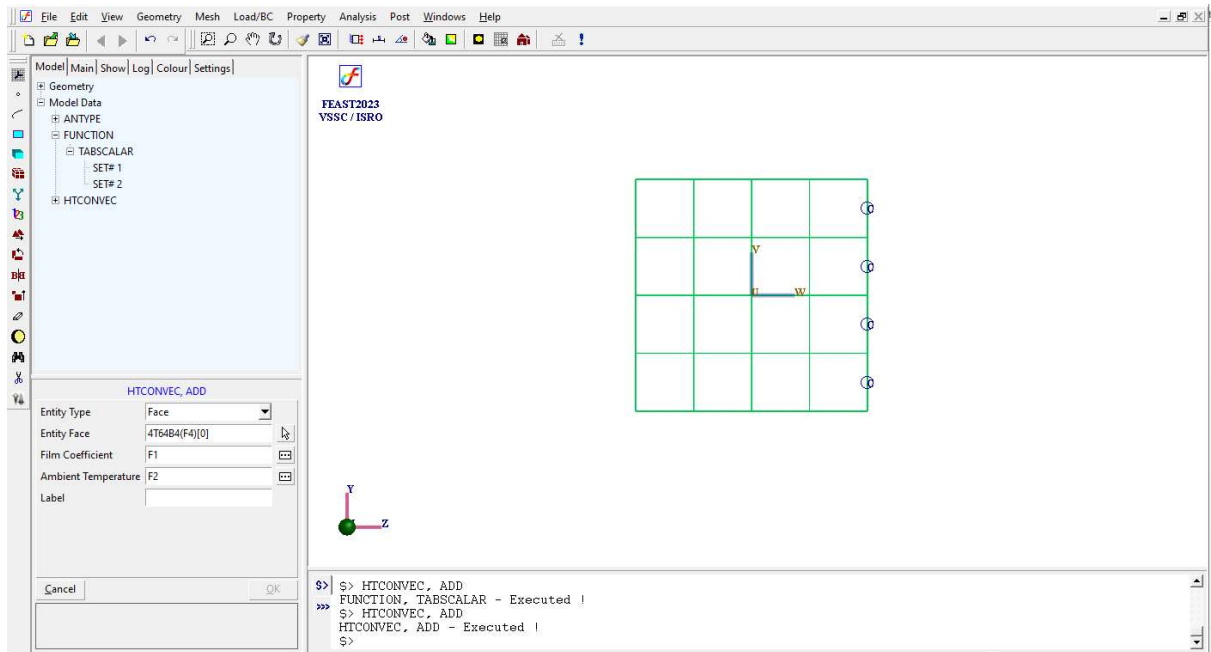
Command : HTCONVEC, ADD

Parameters :

Entity Type	Face
Entity Face	Select the front face as described in problem definition
Film coefficient	F1 
Ambient Temperature	F2 
Label	1

(Use the Dialog box to pick the required table that is already defined in the previous step)

At the end of the above operations, your screen should look like this.



6 Specify material properties

Menu : Property → Material → Thermal → Isotropic

Command : MATERIAL, HTISOTROPIC

Parameters :

Elements	All
Thermal Conductivity	121
Density	2800
Specific Heat	963

7 Specify transient general data

Menu : Analysis → HT Analysis → Transient Data

Command : TRANSHTDATA, ADD

Parameters :

Initial temperature	313
Total Time	10
Time Increment	0.1
Output steps	5
Time integration	Implicit



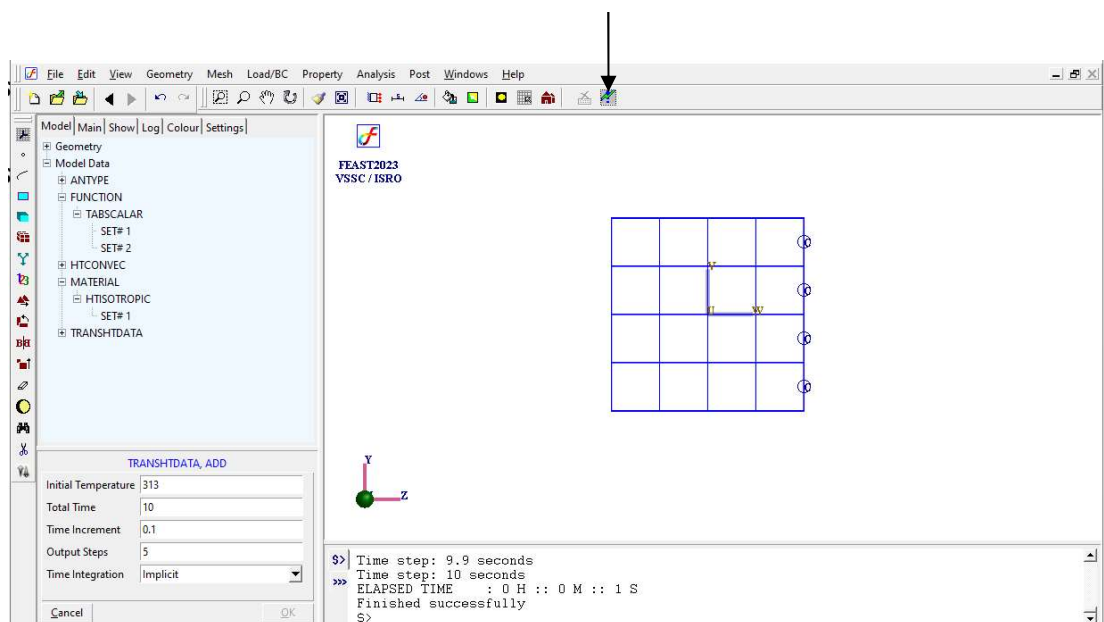
TRANSHTDATA, ADD	
Initial Temperature	313
Total Time	10
Time Increment	0.1
Output Steps	5
Time Integration	Implicit

8 Save the project model

Menu : File → Save

9 Submit the job into FEAST

Click here



After the solution is completed the message *“Finished successfully”* appears in the message box.

10 Perform post processing

a) Contour

Menu : Post → Contour

Command : POST, CONTOUR



Parameters :

Item	Temperature
Time Step	10
Contour Type	Band
Decimal Places	2
LCS	Global Cartesian
No. of contours	9
Scale Factor	1

At the end of the above operations, your screen should look like this.

