

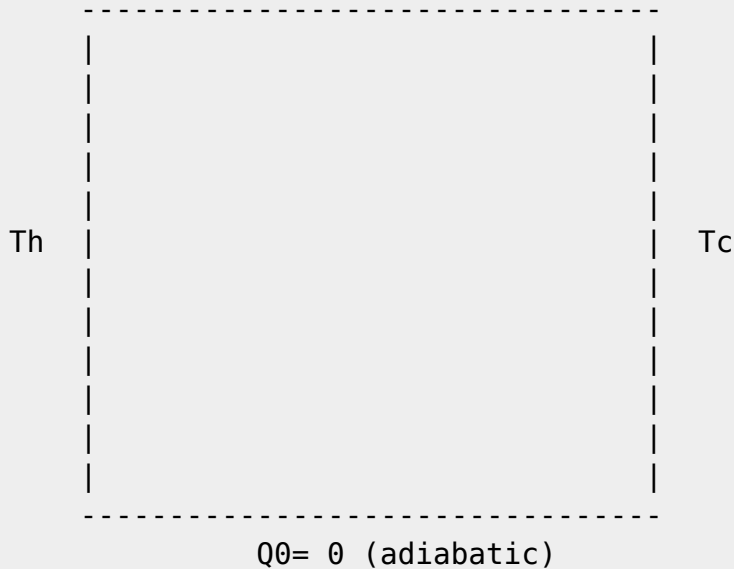
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MAIN INPUT DATA FILE : 2D HEAT-DRIVEN CAVITY FLOW

DIMENSIONLESS FORM :

$Ra = 1.D+06$
 Density scale : ρ_0 (fluid density)
 Length scale H : height of cavity
 Velocity scale $U_0 = (k/H).Ra^{0.25}$ (k thermal diffusivity)
 Temperature scale $Th - Tc$ ($Th = T_{hot}$; $Tc = T_{cold}$)
 Dimensionless Velocity $U^* = U/U_0$
 Dimensionless Temperature $T^* = (T - Tc)/(Th - Tc)$
 dimensionless kinematic viscosity = $\nu/U_0 H$
 dimensionless thermal diffusivity = $\alpha/U_0 H$
 dimensionless buoyancy term = $\beta(T - Tc)$
 dimensionless domain $Lx/H = 1$, $Ly/H = 1$
 $Pr/Ra^{0.5}$
 $1/Ra^{0.5}$
 $Pr.T^*$
 1

$Q_0 = 0$ (adiabatic)



J
 $|$
 $|$
 $|$
 $-----> I$

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GENERAL LAYOUT
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&Version File_Version="VERSION2.0"/

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FLUID PROPERTIES
(DIMENSIONLESS FORM)

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&Fluid_Properties Heat_Transfer_Flow = .true. , Reference_Density= 1.0,
Reference_Temperature= 1.0 ,
Reference_Dynamic_Viscosity= 0.71D-03 ,
Prandtl = 0.71 ,
Thermal_Expansion_Coefficient= 1.0 /

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UNIFORM INITIALIZATION OF THE VELOCITY COMPONENTS AND TEMPERATURE
(DIMENSIONLESS FORM)

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&Velocity_Initialization I_Velocity_Reference_Value = 0.0 ,
J_Velocity_Reference_Value = 0.0 , K_Velocity_Reference_Value
= 0.0 /
&Temperature_Initialization Temperature_Reference_Value = 0.5 /

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GRAVITY
(DIMENSIONLESS FORM)

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&Gravity Gravity_Enabled= .true. , Gravity_Angle_IJ= 90.0 ,
Gravity_Angle_IK= 90.0 , Reference_Gravity_Constant= 0.71/

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DOMAIN FEATURES

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&Domain_Features Start_Coordinate_I_Direction= 0.00 ,
End_Coordinate_I_Direction= 1.00,
Start_Coordinate_J_Direction= 0.00 ,
End_Coordinate_J_Direction= 1.00,
Start_Coordinate_K_Direction= 0.00 ,
End_Coordinate_K_Direction= 0.00,
Cells_Number_I_Direction= 256 ,Cells_Number_J_Direction=256
,Cells_Number_K_Direction= 1,
Regular_Mesh= .true. /

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DEFINITION OF BOUNDARY CONDITIONS

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WALL BOUNDARY CONDITION SETUP

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&Heat_Wall_Boundary_Condition_Setup
West_Heat_BC_Option = 0 , East_Heat_BC_Option = 0 ,

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Back_Heat_BC_Option = 1 , Front_Heat_BC_Option = 1 , South_Heat_BC_Option
= 0 , North_Heat_BC_Option = 0,
    West_Wall_BC_Value= 1.0 , East_Wall_BC_Value= 0.0 ,
Back_Wall_BC_Value= 0.0 , Front_Wall_BC_Value= 0.0 , South_Wall_BC_Value=
0.0 , North_Wall_BC_Value= 0.0 ,
    End_of_Data_Block= .true. /
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BORDER BOUNDARY CONDITIONS : The walls located by default at the ends of the
domain remain unchanged
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&Border_Domain_Boundary_Conditions West_Border= 0 , East_Border= 0 ,
Back_Border= 0 , Front_Border= 0 , North_Border = 0 , South_Border = 0 /
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NUMERICAL METHODS

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Navier-Stokes equations ---> BDF2 + 2nd order centered scheme , semi-
implicit
convection flux          ---> conservative form
Poisson                  ---> Relaxed Gauss-Seidel method + Multigrid

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&Numerical_Methods Numerical_Scheme= 1 ,
                    Convective_Flux_Discretization_Type = 1 ,
Temperature_Advective_Flux_Discretization_Type = 1 ,
                    Explicit_Solving_of_Density          = 0 ,
Velocity_Correction_Enabled          = .true.,
                    Numerical_Method_Poisson_Equation     = 1 ,
Number_max_Grid= 5, Number_max_Cycle= 10 , Number_Iteration= 15 ,
                    Relaxation_Coefficient= 1.7 , Convergence_Criterion=
1.D-10 /

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SIMULATION MANAGEMENT
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The numerical time step is estimated by means of the CFL coefficient

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&Simulation_Management Restart_Parameter= 0 ,
                        Steady_Flow_Stopping_Criterion_Enabled = .true. ,
Steady_Flow_Stopping_Criterion = 1.D-16,
                        Temporal_Iterations_Number = 1000000
, Final_Time = 5.D+02 ,
                        TimeStep_Type = 0 ,
                        Timestep_Min = 1.D-03
, Timestep_Max = 1.D-03 ,

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                                CFL_Min      = 0.5
, CFL_Max      = 0.5 ,
                                Iterations_For_Timestep_Linear_Progress= 1,
                                Simulation_Backup_Rate      = 1000
, Simulation_Checking_Rate = 101 /

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PROBES MANAGEMENT
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=

    NO PROBE

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=
FIELDS RECORDING DECLARATION
=====
=
&Simulation_Management  Fields_Recording_Rate = 5.D+01 /
&Field_Recording_Setup    Check_Special_Features=
"Heat_Driven_Cavity_Flow", Precision_On_Instantaneous_Fields= 2 /   Here, a
special variable devoted to results of heat driven cavity flows is active

&Instantaneous_Fields_Listing  Name_of_Field = "U      " , Recording_Enabled
= .true. /      First velocity component
&Instantaneous_Fields_Listing  Name_of_Field = "V      " , Recording_Enabled
= .true. /      Second velocity component
&Instantaneous_Fields_Listing  Name_of_Field = "T      " , Recording_Enabled
= .true. , End_of_Data_Block= .true. /      Temperature
```

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