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

                DIMENSIONLESS FORM  :
                                        Ra= 1.D+06
                                        Density scale   : rho_0 (fluid
density)
                                        Length scale  H : height of cavity
                                        Velocity scale ---> U0=
(k/H).Ra**0.25 (k thermal diffusivity)
                                        Temperature scale Th - Tc (Th= T hot
; Tc= T cold)
                                        Dimensionless Velocity    U*= U/U0
                                        Dimensionless Temperature T*= (T-
Tc)/(Th-Tc)
                                        dimensionless kinematic viscosity=
Pr/Ra**0.5
                                        dimensionless thermal diffusivity=
1/Ra**0.5
                                        dimensionless buoyancy term      =
Pr.T*
                                        dimensionless domain Lx/H= 1 , Ly/H=
1

                 Q0= 0 (adiabatic)
       ---------------------------------
       |                               |
       |                               |
       |                               |
       |                               |
       |                               |
   Th  |                               |  Tc
       |                               |
       |                               |
       |                               |
       |                               |
       |                               |
       |                               |
       ---------------------------------
                 Q0= 0 (adiabatic)
   J
   |
   |
   |
   ----> I
================================================================================
================================================================================
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
GENERAL LAYOUT
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
&Version File_Version="VERSION2.0"/
================================================================================
                FLUID PROPERTIES
               (DIMENSIONLESS FORM)
================================================================================
&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 /
================================================================================
   UNIFORM INITIALIZATION OF THE VELOCITY COMPONENTS AND TEMPERATURE
                  (DIMENSIONLESS FORM)
================================================================================
&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 /
================================================================================
                        GRAVITY
                  (DIMENSIONLESS FORM)
================================================================================
&Gravity  Gravity_Enabled= .true. , Gravity_Angle_IJ= 90.0  ,
Gravity_Angle_IK= 90.0 , Reference_Gravity_Constant= 0.71/
================================================================================
                    DOMAIN FEATURES
================================================================================
&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. /

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
DEFINITION OF BOUNDARY CONDITIONS
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++
================================================================================
=
WALL BOUNDARY CONDITION SETUP
================================================================================
=
Keep in mind that the domain is enclosed by default.
No new boundary conditions are defined at the ends of the domain : the walls
by default are preserved
```

```
&Heat_Wall_Boundary_Condition_Setup
      West_Heat_BC_Option = 0   ,  East_Heat_BC_Option = 0  ,
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.   /
================================================================================
=
BORDER BOUNDARY CONDITIONS : The walls located by default at the ends of the
domain remain unchanged
================================================================================
=

&Border_Domain_Boundary_Conditions West_Border= 0 , East_Border= 0 ,
Back_Border= 0 , Front_Border= 0 , North_Border = 0 , South_Border = 0 /
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
                    NUMERICAL METHODS
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
Navier-Stokes equations ---> BDF2 + 2nd order centered scheme , semi-
implicit
convection flux         ---> conservative form
Poisson                 ---> Relaxed Gauss-Seidel method + Multigrid

&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 /

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++
SIMULATION MANAGEMENT
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++

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

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

================================================================================
=
PROBES MANAGEMENT
================================================================================
=

     NO PROBE
================================================================================
=
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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