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input3d.dat

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

                DIMENSIONLESS FORM  :
                                       Ra= 1.D+04
                                       Density scale   : rho_0 (fluid
density)
                                       Length scale  H : height of
cavity
                                       Velocity scale ---> U0=
(k/H).Ra**0.5 (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

                                       Reference results (De Wahl
Davis, IJNMF , Vol 3, 1983):
                                          Averaged Nusselt number at
the wall               : 2.243
                                          Averaged Nusselt number at
the vertical mid-plane : 2.243
                                          Maximum Nusselt number at the
wall                : 3.528
                                          Minimum Nusselt number at the
wall                : 0.586
                                          Maximum value of the vertical
velocity (horizontal mid-plane) : 0.19617
                                          Maximum value of the
horizontal velocity (vertital mid-plane) : 0.16178


                 Q0= 0 (adiabatic)
       ---------------------------------
       |                                |
       |                                |
       |                                |
       |                                |
```

```
       |                                |
   Th  |                                |  Tc
       |                                |
       |                                |
       |                                |
       |                                |
       |                                |
       |                                |
       ---------------------------------
                 Q0= 0 (adiabatic)
   J
   |
   |
   |
   ----> I
=======================================================================
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=======================================================================
====
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+++++
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-02  ,
                   Reference_Heat_Capacity=  1.0 ,
                   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 /
```

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========================================================================
====
                        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= 64
,Cells_Number_J_Direction=64 ,Cells_Number_K_Direction= 1,
                 Regular_Mesh= .true. /

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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
      Wall_BC_DataSetName ="Set1",
      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 /

========================================================================
======
BORDER BOUNDARY CONDITIONS : The walls located by default at the ends
```

```
of the domain remain unchanged
========================================================================
======
!--- No new boundary conditions are defined at the ends of the domain :
walls by default are preserved, the inlet and outlet previously are
defined above)
!--- As "None" is the default setting for this namelist, it can be
removed

&Border_Domain_Boundary_Conditions West_BC_Name= "None" , East_BC_Name=
"None" , Back_BC_Name= "None" , Front_BC_Name= "None" , North_BC_Name=
"None" , South_BC_Name= "None" /
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+++++++
                   NUMERICAL METHODS
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++
&Numerical_Methods  NS_NumericalMethod= "BDF2-SchemeO2"
,       !--- BDF2 + 2nd order centered scheme
                    MomentumConvection_Scheme="Centered-O2-
Conservative"   ,       !--- conservative form for solving the velocity
(momentum) equation
                    Poisson_NumericalMethod="Home-SORMultigrid-
ConstantMatrixCoef"  / !--- SOR  + multigrid method (homemade release)
for solving the Poisson's equation with constant coefficient matrix

&HomeData_PoissonSolver  SolverName="SOR"               ,          !---
Successive Over-Relaxation (SOR) method based on the red-black
algorithm
                            Relaxation_Coefficient= 1.7 ,          !---
Relaxation coefficient of the SOR method ( 1 <= Relaxation_Coefficient
< 2)
                            Number_max_Grid= 6,                    !---
Number of grid levels
                            Number_max_Cycle= 1,                  !---
Number of multigrid cycles
                            Number_Iteration_FineToCoarseGrid= 3, !---
number of SOR iterations applied on any grid level during the
restriction step (before the coarsest grid computation)
                            Number_Iteration_CoarseToFineGrid= 15, !---
number of SOR iterations applied on any grid level during the
prolongation step (after the Coarsest grid computation)
                            Number_Iteration_CoarsestGrid= 15 ,    !---
number of SOR iterations applied on the coarsest grid
                            Convergence_Criterion= 1.D-08 /        !---
convergence tolerance on the residu of the Poisson's equation

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SIMULATION MANAGEMENT
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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 = 10000
, Final_Time = 5.D+02  ,
                          TimeStep_Type = 1 ,
                             Timestep_Min = 5.D-02
, Timestep_Max = 5.D-02 ,
                             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 SETUP
=======================================================================
======
&Simulation_Management
    InstantaneousFields_RecordingReset=.false.     ,
    InstantaneousFields_TimeRecordingRate= 5.0E+00 ,
    InstantaneousFields_RecordingStartTime= 0.D-00  /
&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     "  /      First
velocity component
&Instantaneous_Fields_Listing  Name_of_Field = "V     "  /      Second
velocity component
&Instantaneous_Fields_Listing  Name_of_Field = "T     "  /
Temperature

END OF FILE
```

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