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input3d.dat

```
================================================================================
================================================================================
            MAIN INPUT DATA FILE : 2D RAYLEIGH-BENARD CONFIGURATION
            DIMENSIONLESS FORMULATION

            ------------------------- Top wall (T_2)
       |                                 |
       |                                 |
     H |  <------ Symmetric BC ------->  |
       |                                 |
       |                                 |
            ------------------------- Bottom  wall (T_1)

            <---------------------->
                      2.H

            Reference Temperature = (T_1+T_2)/2

================================================================================
================================================================================
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                     GENERAL LAYOUT
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
&Version File_Version="VERSION2.0"/
================================================================================
                FLUID PROPERTIES
               (DIMENSIONLESS FORM)
================================================================================
&Fluid_Properties  Heat_Transfer_Flow = .true.   ,  Reference_Density=
1.0,
                   Reference_Heat_Capacity=  1.0 ,
                   Reference_Temperature= 0.5  ,
Reference_Dynamic_Viscosity= 1.8D-02  ,
                   Prandtl = 0.72              /
================================================================================
   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 ,
White_Noise_Magnitude_For_Temperature= 0.00/
==========================================================================
====
                        GRAVITY
                  (DIMENSIONLESS FORM)
==========================================================================
====
&Gravity  Gravity_Enabled= .true. , Gravity_Angle_IJ= 90.0  ,
Gravity_Angle_IK= 90.0 , Reference_Gravity_Constant= 0.72/
==========================================================================
====
                     DOMAIN FEATURES
==========================================================================
====
&Domain_Features Start_Coordinate_I_Direction= 0.00 ,
End_Coordinate_I_Direction= 2.00,
                 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= 128
,Cells_Number_J_Direction=64 ,Cells_Number_K_Direction= 1,
                 Regular_Mesh= .true. /

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++
              DEFINITION OF BOUNDARY CONDITIONS
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++
==========================================================================
======
                 WALL BOUNDARY CONDITION SETUP
==========================================================================
======
&Heat_Wall_Boundary_Condition_Setup
      West_Heat_BC_Option = 1   ,  East_Heat_BC_Option = 1  ,
Back_Heat_BC_Option = 0  ,  Front_Heat_BC_Option = 0  ,
South_Heat_BC_Option = 0 , North_Heat_BC_Option = 0,
      West_Wall_BC_Value= 0.0   ,  East_Wall_BC_Value= 0.0  ,
Back_Wall_BC_Value= 1.0  ,  Front_Wall_BC_Value= 0.0  ,
South_Wall_BC_Value= 0.0 , North_Wall_BC_Value= 0.0 /
==========================================================================
======
               BORDER BOUNDARY CONDITIONS
```

```
================================================================================
&Border_Domain_Boundary_Conditions West_BC_Name= "Symmetric" ,
East_BC_Name= "Symmetric" , Back_BC_Name= "None" , Front_BC_Name=
"None" , North_BC_Name= "None" , South_BC_Name= "None" /
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    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= 4,                    !---
Number of grid levels
                            Number_max_Cycle= 10,                  !---
Number of multigrid cycles
                            Number_Iteration= 0,                   !---
Maximum number of SOR iterations method applied for any grid level, if
0 (or removed) the 3 next data are considered
                            Number_Iteration_FineToCoarseGrid= 15, !---
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
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    SIMULATION MANAGEMENT
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

The numerical time step is dynamic and is estimated by the constant 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 = 5.D-02
, Timestep_Max = 5.D-02 ,
                          CFL_Max      = 0.5 ,
                          Simulation_Backup_Rate                 = 1000
, Simulation_Checking_Rate = 101 /
================================================================================
======
                    PROBES MANAGEMENT
================================================================================
======
                                                          Probes order    U
, V     , W      , T      , P      , RHO
&Probe_Quantities_Enabled  Temporal_Series_For_Quantity_Enabled(:) =
.true., .true., .false., .true., .true. , .false. /
&Probe_Location  Xi= 0.5 , Xj= 0.7 , Xk= 0.0 /
&Simulation_Management      Probe_RecordingReset=.false. ,
    Probe_StartTimeIterationRecording= 0          ,  !--- in time-
iteration units
    Probe_TimeIterationRecordingRate      = 1       !--- in time-
iteration units
    /

================================================================================
======
           FIELDS RECORDING DECLARATION
================================================================================
======
&Simulation_Management  Fields_Recording_Rate = 1.D+01 /
&Field_Recording_Setup  Precision_On_Instantaneous_Fields= 2 /

&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
```

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