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input3d.dat

```
=======================================================================
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=======================================================================
====
            MAIN INPUT DATA FILE : 2D CHANNEL FLOW WITH A CONSTRICTION
(A RECTANGULAR BAR)
                                   INCOMPRESSIBLE FLOW
                                   ISOTHERM

            DIMENSIONLESS LAYOUT :

                 Length scale     : h (the channel height)
                 Reynolds number    Re_h= rho_0.U_0.h/mu= 100

                 dimensionless quantities :
                   velocity U*      = U/U_0
                   kinetic viscosity= 1/Re_h

                 dimensionless domain : Lx/h= 10

                 Initialisation = uniform velocity field
                 inlet flowrate = parabolic profil

INCOMPRESSIBLE DOWNSTEP FLOW


------------------------------------------
                 |       |
                 |_______|
---> inflow                     outflow --->

------------------------------------------
J
^
|
|
---->I
=======================================================================
====
=======================================================================
====
&Version File_Version="VERSION2.0"/
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++
                     GENERAL LAYOUT
                     (DIMENSIONLESS)
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

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+++++
&Fluid_Properties         Reference_Dynamic_Viscosity = 1.00D-02,
Reference_Density= 1.0 /

&Velocity_Initialization  I_Velocity_Reference_Value  = 1.0 ,
J_Velocity_Reference_Value = 0.0 , K_Velocity_Reference_Value = 0.0 /
=======================================================================
====
                    DOMAIN FEATURES
                     (DIMENSIONLESS)
=======================================================================
====
&Domain_Features Start_Coordinate_I_Direction= 0.00 ,
End_Coordinate_I_Direction= 10.00,
                 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= 64 ,Cells_Number_K_Direction= 1,
                 Regular_Mesh= .true. /

---------------------------------------------------
     GEOMETRY OF THE IMMERSED BODIES
---------------------------------------------------

First (and unique) immersed body

&Polyhedral_Immersed_Bodies  Xi_1= 4.5  , Xj_1= 0.5 ,Xk_1= 0.0  , Xi_2=
5.5  , Xj_2= 0.5 ,Xk_2= 0.0 ,
                             Xi_3= 5.5  , Xj_3= 1.0  ,Xk_3= 0.0 , Xi_4=
4.5  , Xj_4= 1.0  ,Xk_4= 0.0 ,
                             Wall_BC_DataSetName= "Set1"/

+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++
              DEFINITION OF BOUNDARY CONDITIONS
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++
=======================================================================
======
                 WALL BOUNDARY CONDITION SETUP
                     (DIMENSIONLESS)
=======================================================================
======
---------------------------------------------------
DATA SET FOR THE WALL BOUNDARY CONDITIONS
---------------------------------------------------
first set of wall boundary condition
(This set corresponds to the default wall boundary conditions for the
```

```
velocity. It is just shown for example and could be removed)

&Velocity_Wall_Boundary_Condition_Setup
 Wall_BC_DataSetName ="Set1",
 West_Wall_Velocity_I= 0.0   ,   East_Wall_Velocity_I= 0.0   ,
Back_Wall_Velocity_I= 0.0    , Front_Wall_Velocity_I= 0.0    ,
South_Wall_Velocity_I= 0.0    , North_Wall_Velocity_I= 0.0 ,
 West_Wall_Velocity_J= 0.0   ,   East_Wall_Velocity_J= 0.0   ,
Back_Wall_Velocity_J= 0.0    , Front_Wall_Velocity_J= 0.0    ,
South_Wall_Velocity_J= 0.0    , North_Wall_Velocity_J= 0.0 ,
 West_Wall_Velocity_K= 0.0   ,   East_Wall_Velocity_K= 0.0   ,
Back_Wall_Velocity_K= 0.0    , Front_Wall_Velocity_K= 0.0    ,
South_Wall_Velocity_K= 0.0    , North_Wall_Velocity_K= 0.0 /

=======================================================================
               INLET AND OUTLET  BOUNDARY CONDITIONS
                     (DIMENSIONLESS)
=======================================================================
Keep in mind that the domain is enclosed by default.
Here the inlet and outlet conditions are located at the ends of the
domain. They replace the walls by default over the areas of interest.

Inlet : Uniform flowrate profil

&Inlet_Boundary_Conditions  Type_of_BC= "INLET", Direction_Normal_Plan=
1 , Flow_Direction= 1 ,
                            Define_Velocity_profile = 1 ,
                            Plan_Location_Coordinate=  0.0    ,
                            Start_Coordinate_of_First_Span =  0.00  ,
End_Coordinate_of_First_Span = 1.00 ,
                            Start_Coordinate_of_Second_Span= 0.0    ,
End_Coordinate_of_Second_Span= 0.0  ,
                            Normal_Velocity_Reference_Value= 1.0  /

&Outlet_Boundary_Conditions  Type_of_BC= "OUTLET",
Direction_Normal_Plan= 1 , Flow_Direction= 1 ,
                             Plan_Location_Coordinate=  10.0   ,
                             Start_Coordinate_of_First_Span =  0.00  ,
End_Coordinate_of_First_Span = 1.00 ,
                             Start_Coordinate_of_Second_Span= 0.0    ,
End_Coordinate_of_Second_Span= 0.0  /
=======================================================================
               BORDER BOUNDARY CONDITIONS
=======================================================================
!--- 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" /
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++
                   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_CoarsestGrid= 15 ,    !---
number of SOR iterations applied on the coarsest grid
                            Number_Iteration_CoarseToFineGrid= 15, !---
number of SOR iterations applied on any grid level during the
prolongation step (after the Coarsest grid computation)
                            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 = 100000
, Final_Time = 5.D+01  ,
                          TimeStep_Type = 1 ,
                          CFL_min= 0.25   , CFL_max= 0.25,
Iterations_For_Timestep_Linear_Progress= 1 ,
                          Timestep_Max = 1.D+03 ,
                          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., .false., .true. , .false. /

&Probe_Location  Xi= 3.0 , Xj= 0.5 , Xk= 0.0  /
&Probe_Location  Xi= 6.0 , Xj= 0.5 , Xk= 0.0  /
&Simulation_Management   Probe_Recording_Rate = 10 /

=======================================================================
======
           FIELDS RECORDING DECLARATION
=======================================================================
======
&Field_Recording_Setup    Precision_On_Instantaneous_Fields= 2 /

!--- Snapshots

&Simulation_Management    Fields_Recording_Rate = 5.D+00  /
&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

!--- Statistics

&Simulation_Management    Start_Time_For_Statistics= 1.D+03
, Time_Range_Statistic_Calculation = 5.D+00  /

&Statistical_Fields_Listing  Name_of_Field = "<U>   " ,
Recording_Enabled = .true.  /
&Statistical_Fields_Listing  Name_of_Field = "<V>   " ,
```

```
Recording_Enabled = .true.  /

END OF FILE
```

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