Inlet_Boundary_Condition

This data setup are used to define the inflow condition features. The inflow geometry is restricted to rectangular/line forms in 3D/2D configuration. In the particular case of cylindrical geometries, the inlets can be circular, annular or bowed retangular. In fact, the geometry of the inlet fits the grid topology.

Full data set of the namelist

&Inlet_Boundary_Conditions

```
                          Type_of_BC= "INLET", Direction_Normal_Plan= 1 ,
                          Plan_Location_Coordinate= -0.05   ,
                          Start_Coordinate_of_First_Span = -0.01  ,
End_Coordinate_of_First_Span = 0.01 ,
                          Start_Coordinate_of_Second_Span= 0.0    ,
End_Coordinate_of_Second_Span= 0.0  ,
                          Flow_Direction= 1 ,
                          Normal_Velocity_Reference_Value= 1.5E-3  ,
Temperature_Reference_Value= 293.0 , Density_Reference_Value=  1.66328E-1,
                          Define_Velocity_profile= 0 ,
                          Species_Boundary_Condition_Type= 0 ,
Define_Mass_Fraction_profile= 0 ,
                          Temporal_Variation_For_Each_Species= 0 ,
                          Species_Reference_Value= 1.0 ,
                          Time_Fct_Name= "Sinus" , Time_Fct_Threshold= 0.0 ,
Time_Fct_Time_Scale= 1.0 , Time_Fct_Magnitude= 0.0 ,
                          End_of_Data_Block= .true. /
```

- Whatever the grid topology, the orientation and the span of the inflow are defined by means of :
  - the normal vector of the inlet plane associated to a specific direction (I,J or K).
  - the coordinates associated to the position of the inlet sides along the two perpendicular directions to the normal vector (denoted the first and second span directions).
- When the normal vector is oriented along the I-direction, the first span direction is J and the second is K.
- When the the normal vector is oriented along the J-direction, the first span direction is I and the second is K.
- When the the normal vector is oriented along the K-direction, the first span direction is I and the second is J.
- When the inflow conditions are constant the time data can be omitted.
- Don't forget to set the boolean data “End_of_Data_Block” at the end of the namelist. A “.true.” value means the end of the data block when several namelists are used to create several inlets.

Definition of the data set

Type_of_BC

- Type : String of 6 characters
- Name to define the inflow boundary conditions type. Only one kind of inlet boundary condition is defined at present (Dirichlet type) and the associated name is "INLET".

Direction_Normal_Plan

- Type : integer value
- This data defines the orientation of the normal vector the inlet in respect with the grid {I,J,K}. The values 1, 2 or 3 point the I, J or K-direction, respectively.

Plan_Location_Coordinate

- Type: real value
- Coordinate of the position of the inlet plan along the normal direction previously defined.

Start_Coordinate_of_First_Span

- Type : real value
- This coordinate defines the lower side of the inlet plan span along "the first direction" (see the note above).

End_Coordinate_of_First_Span

- Type : real value
- This coordinate defines the upper side of the inlet plan span along "the first direction" (see the note above).

Start_Coordinate_of_Second_Span

- Type : real value
- This coordinate defines the lower side of the inlet plan span along "the second direction" (see the note above).

End_Coordinate_of_Second_Span

- Type : real value
- This coordinate defines the upper side of the inlet plan span along “the second direction” (see the note above).

Flow_Direction

- Type : integer value
- This value is set to 1 or -1. It indicates the presumed direction of the inflow in accordance to the position of the outlet. If the inflow is oriented along the increasing or decreasing index (for a given direction) the value is set to 1 or -1, respectively.

Normal_Velocity_Reference_Value

- Type : real value
- Reference value of the normal component of the velocity. The other ones are automatically set to zero.

Define_Velocity_profile

- Type : Integer value
- Type of the velocity profile over the inlet :
  - 0 : Uniform profile
  - 1 : Parabolic profile along the first span direction (the mean velocity at the inlet is defined with the “Normal_Velocity_Reference_Value”)
  - 2 : Parabolic profile along the second span direction (the mean velocity at the inlet is defined with the “Normal_Velocity_Reference_Value”)

Variable_Flowrate

- Type : Integer value
- This data allows the user to define a time variation of the flowrate :
  - 0 : the flowrate is constant
  - 1 : the flowrate is variable in time. The time functions can be defined by the users in the specific module of the code named “module_user_defined_temporal_function.f90”. The parameters of the time-function can be read from the following variables :
    - Time_Fct_Name :character string bounded to the user's time function defined in the module “module_user_define_temporal_function.f90”. At present, two temporal functions are available, The sinusoidal function (named “Sinus”) and the linear-ramp function, (called “ Linear_Ramp”).
    - Time_Fct_Threshold : time from which the time function starts.
    - Time_Fct_Time_Scale : time scale of the function (i.e the period for the sinusoidal function, and the time range for the linear ramp function)
    - Time_Fct_Magnitude : magnitude of the time function.

Temperature_Reference_Value

- Type : real value

- Reference value of the temperature.

Density_Reference_Value

- Type : real value
- Reference value of the fluid density.

Species_Reference_Value

- Type : array of real values (the size is determined by the species number considered)
- This data setup defines the reference value of mass fractions for each species

Species_Boundary_Condition_Type

- Type : integer value
- This option defines the inlet boundary
- condition type for the density of species
  - 0 : Dirichlet condition (the mass fraction value is imposed at the center of the ghost-cell).
  - 1 : The mass flux value is imposed on the inlet plan. This flux is defined as the product of the variables “Define_Velocity_profile”, “Normal_Velocity_Reference_Value” and “Species_Reference_Value” (Rho.U.Yi).

Define_Mass_Fraction_profile

- Type : integer value
- This data determines the distribution law on the first species mass fraction over the inlet (the complementary law is reported on the 2nd species by default):
  - 0 : Uniform profile
  - 1 : Heaviside profile centered on the inlet

Temporal_Variation_For_Each_Species

- Type : array of integer value (the size is determined by the species number considered)
- This data setup defines time function used to define the temporal variation of species. The time functions can be programmed by the user in the fortran file named “module_user_define_temporal_functions.f90”. Sinusoidal and linear ramp functions can be used by means of time parameters already described in the part “Variable_Flowrate” .

End_of_Data_Block

- Type : boolean value
- Specify the end of the namelist or a group of this type of namelist (if true).

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Last update: **2016/11/20 11:32**