

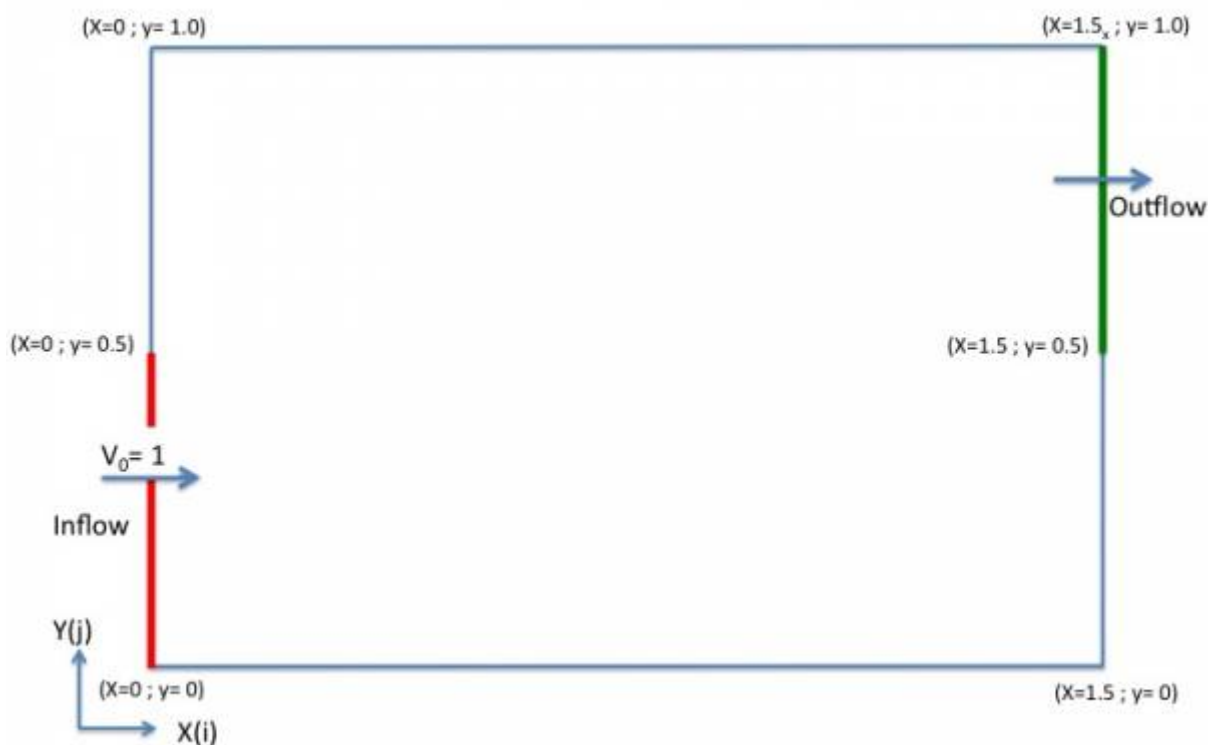
## Example of inflow/outflow boundary conditions

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- This example is defined for a 2D geometrical configuration. The size of the domain is  $1.5 \times 1.0$ .
- The flow is homogeneous (no multi-species gas)
- An inlet is located at the down left side of the domain.
- An outlet is located at the top right side of the domain.
- Conditions are constant in time



## Inflow data

### Example 1



- The flow is homogeneous (no multi-species gas)
- Conditions are constant in time

```
&Inlet_Boundary_Conditions
Type_of_BC= "INLET", Direction_Normal_Plan= 1 ,
Plan_Location_Coordinate= 0.0 ,
Start_Coordinate_of_First_Span = 0.0, End_Coordinate_of_First_Span = 0.5,
Start_Coordinate_of_Second_Span= 0.0 , End_Coordinate_of_Second_Span= 0.0
,
Flow_Direction= 1 ,
Normal_Velocity_Reference_Value= 1.0 ,
Temperature_Reference_Value= 293.0 ,
Density_Reference_Value= 1.2,
Define_Velocity_profile= 0 ,
End_of_Data_Block= .true. /
```

## Example 2

### **Not for the release SUNFLUIDH\_EDU**



- The flow is homogeneous (no multi-species gas)
- The temperature and the density are constant.
- The normal velocity component is time-dependent :
  - The function is sinusoidal. The mean value of the time function is given by "Normal\_Velocity\_Reference\_Value".
  - the frequency is 10 Hz
  - The magnitude is 40% of the mean inlet velocity

```
&Inlet_Boundary_Conditions
Type_of_BC= "INLET", Direction_Normal_Plan= 1 ,
Plan_Location_Coordinate= 0.0 ,
Start_Coordinate_of_First_Span = 0.0, End_Coordinate_of_First_Span = 0.5,
Start_Coordinate_of_Second_Span= 0.0 , End_Coordinate_of_Second_Span= 0.0
,
Flow_Direction= 1 ,
Normal_Velocity_Reference_Value= 1.0 ,
Temperature_Reference_Value= 293.0 ,
Density_Reference_Value= 1.2,
Define_Velocity_profile= 0 ,
Time_Fct_Name= "Sinus" , Time_Fct_Threshold= 0.0 ,
Time_Fct_Time_Scale= 0.1 , Time_Fct_Magnitude= 0.4 ,
End_of_Data_Block= .true. /
```

## Outflow data

## Example 1



- The outflow is based on the mass flowrate conservation.
- The normal pressure gradient is zero (Neumann boundary condition).

&Outlet\_Boundary\_Conditions

```
Type_of_BC= "OUTLET", Direction_Normal_Plan= 1 ,  
Plan_Location_Coordinate= 1.5 ,  
Start_Coordinate_of_First_Span = 0.5 , End_Coordinate_of_First_Span =  
1.0 ,  
Start_Coordinate_of_Second_Span= 0.0 , End_Coordinate_of_Second_Span=  
0.0 ,  
Flow_Direction= 1 ,  
End_of_Data_Block= .true. /
```

## Example 2

**Not for the release SUNFLUIDH\_EDU**



- The outflow is based on pressure conditions.
- The (dynamic) pressure value is given by "Pressure\_Reference\_Value". It is imposed out of the domain and located at a distance "Length\_Scale" from the outflow plan (Robin condition).
- Keep in mind that the pressure is here related to the dynamics, not to the thermodynamics of the flow. It is therefore defined from a reference value which can be null.

&Outlet\_Boundary\_Conditions

```
Type_of_BC= "FREEBC", Direction_Normal_Plan= 1 ,  
Plan_Location_Coordinate= 1.5 ,  
Start_Coordinate_of_First_Span = 0.5 , End_Coordinate_of_First_Span =  
1.0 ,  
Start_Coordinate_of_Second_Span= 0.0 , End_Coordinate_of_Second_Span=  
0.0 ,  
Flow_Direction= 1 ,  
Pressure_Reference_Value = 0.0 , Length_Scale= 0.2 ,  
End_of_Data_Block= .true. /
```

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Last update: **2016/11/29 11:26**

