# Outlet_Boundary_Condition

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

## Full data set of the namelist

```
  &Outlet_Boundary_Conditions
   Type_of_BC= "OUTLET", 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 ,
   Pressure_Reference_Value       = 0.0    ,  Length_Scale                =
1.0  ,
   Flow_Direction= 1 ,
   End_of_Data_Block= .true. /
```

- Whatever the grid topology, the orientation and the span of the outflow are defined by means of :
  - the normal vector of the outlet plane associated to a specific direction (I,J or K).
  - the coordinates associated to the position of the outlet 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.
- By default the domain is enclosed. The boundary conditions defined by default at the ends of the domain are walls. When an outlet is placed at the end of the domain, it replaces the wall conditions over the outflow area.
- 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 outlets.

Find some examples here about outflow configurations.

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## Definition of the data set

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## Type_of_BC

- Type : String of 6 characters
- Name to define the outflow boundary conditions type. Three kind of outlet boundary conditions are defined :
    - OUTLET : This boundary condition is based on the mass or volumic flowrate conservation to estimate the normal component distribution of the velocity at the outlet. Tangential velocity components are extrapolated and the a zero normal gradient is imposed for the pressure. This boundary condition can be only used if just one outflow is present.
    - OUT_PF : The pressure is imposed at the outlet and the normal velocity component is estimated from a simplified Navier-Stokes equation (1D equation along the normal direction of the outlet plan). Tangential velocity components are extrapolated ( **Not for the release SUNFLUIDH_EDU** ).
    - FREEBC : This boundary condition rely on the same concept as the OUT_PF one but the pressure reference-value is imposed at a specific distance behind the outlet plan ( **Not for the release SUNFLUIDH_EDU** ).

## Direction_Normal_Plan

- Type : integer value
- This data defines the orientation of the normal vector the outlet 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 outlet plan along the normal direction previously defined.

## Start_Coordinate_of_First_Span

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

## Pressure_Reference_Value

- Type : real value
- This is the pressure reference value used when the outlet boundary conditions are the type “OUT_PF” or “FREEBC”.

## Length_Scale

- Type : real value
- This data is the length scale value used to define the distance between the outlet plan and the point where the pressure reference value is imposed.

## Flow_Direction

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

## Pressure_Reference_Value

- Type : Real value ( **Not for the release SUNFLUIDH_EDU** )
- Reference value of the imposed dynamical pressure used when “OUT_PF” or “FREEBC” condition is used. This data is omitted when the “OUTLET” condition is used. At present, it is advised to set the pressure reference value to zero.

## Length_Scale

- Type : Real value ( **Not for the release SUNFLUIDH_EDU** )
- Distance between the outlet plane and the position where the pressure reference value is imposed behind the outlet plane when the “FREEBC” condition is used. This data is omitted when the “OUTLET” or the “OUT_PF” condition is used.

## End_of_Data_Block

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