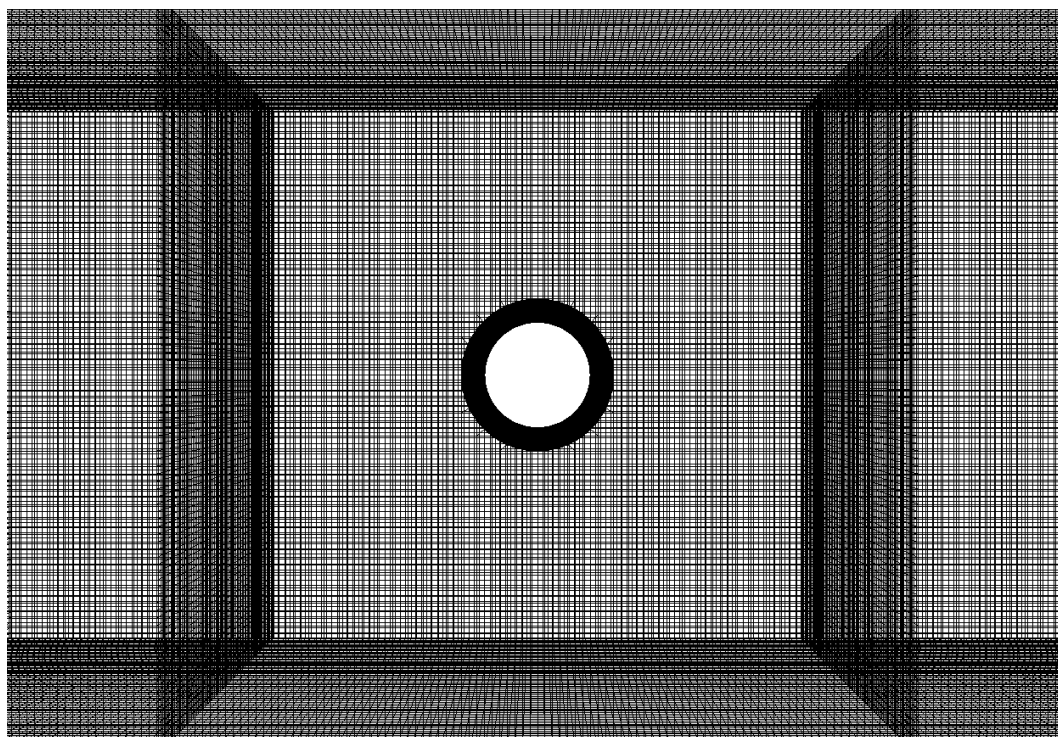


DIVEMesh :: User Guide



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Chapter 1

The 'control.txt' file

1.1 B :: Boundary

B 1 *double* cell size dx

default: 0.0

B 10 * *double* rectangular domain; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

B 22 * *double* sphere; $x_{center}, y_{center}, z_{center}, radius$

default: 0.0 ; 0.0 ; 0.0 ; 0.0

B 31 * *double* straight pipe in x-direction; $x_{start}, x_{end}, y_{center}, z_{center}, radius$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

B 32 * *double* straight pipe in y-direction; $y_{start}, y_{end}, x_{center}, z_{center}, radius$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

B 33 * *double* straight pipe in z-direction; $z_{start}, z_{end}, x_{center}, y_{center}, radius$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

1.2 C :: Channel

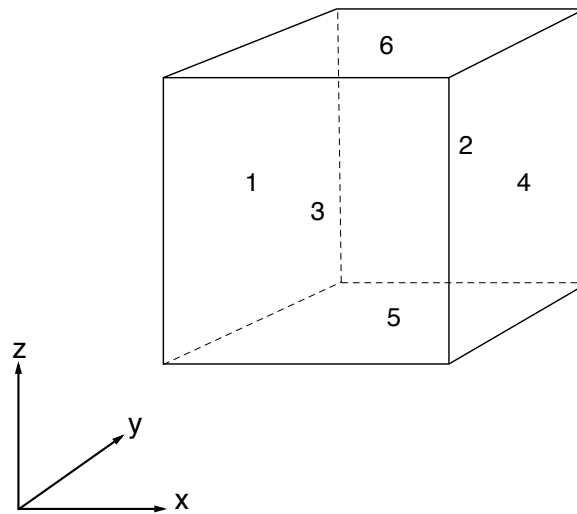


Figure 1.1: Definition of cell sides within DIVEMesh and REEF3D.

C 11 `int` Boundary Condition on Surfside 1

- 1 inflow
- 3 symmetry plane
- 6 wave generation
- 7 numerical beach
- 21 wall
- default:** 21

C 12 `int` Boundary Condition on Surfside 2

- 3 symmetry plane
- 6 wave generation
- 7 numerical beach
- 8 active beach
- 21 wall
- default:** 21

C 13 `int` Boundary Condition on Surfside 3

- 3 symmetry plane
- 6 wave generation
- 7 numerical beach
- 8 active beach
- 21 wall
- default:** 21

C 14 `int` Boundary Condition on Surfside 4

- 2 outflow
 - 3 symmetry plane
 - 6 wave generation
 - 7 numerical beach
 - 8 active beach
 - 21 wall
- default:** 21

C 15 `int` Boundary Condition on Surfside 5

- 3 symmetry plane
 - 21 wall
- default:** 21

C 16 `int` Boundary Condition on Surfside 6

- 3 symmetry plane
 - 21 wall
- default:** 21

1.3 D :: Data Interpolation

D 10 `int` turn data interpolation on/off

- 0 OFF
 - 1 ON
- default:** 0

D 11 `double` Δx , Δy , Δz

default: 0.0 ; 0.0 ; 0.0

D 12 `double` factor x-coordinate, factor y-coordinate, factor z-coordinate,

default: 0.0 ; 0.0 ; 0.0

D 13 `int` Read data every i^{th} iteration

default: 1

D 14 `int` Type of interpolation

1 inverse distance

2 kriging

default: 1

D 15 **int** Number of smoothing iterations

default: 0

D 16 **double** Factor for data smoothing

default: 0.5

D 17 **double** Factor for data inverse distance

default: 16.0

D 18 **double** Range factor for kriging

default: 0.3

D 19 **int** Read dummy letter in front of 3D coordinates

0 OFF

1 ON

default: 0

D 23 **int** reverse sign of data variable in dmdata.dat

0 OFF

1 ON

default: 0

D 24 **double** distance limiter for inverse distance

default: na

1.4 F :: Freecoor

F 3 **double** zstart, zend

default: 0.0

F 11 * **double** left side wall LINE; $x_{start}, x_{end}, y_{start}, y_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ;

F 21 * **double** right side wall LINE; $x_{start}, x_{end}, y_{start}, y_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ;

1.5 G :: Geodat

G 10 **int** turn geodat on/off

0 OFF

1 ON

default: 0

G 11 **double** $\Delta x, \Delta y, \Delta z$

default: 0.0 ; 0.0 ; 0.0

G 12 **double** factor x-coordinate, factor y-coordinate, factor z-coordinate,

default: 0.0 ; 0.0 ; 0.0

G 13 **double** rotation angle of geo coordinates around vertical axis

default: 0.0

G 14 **double** x-coordinate and y-coordinate of origin for the rotation angle of geo coordinates around vertical axis

default: 0.0 ; 0.0

G 15 **int** interpolation scheme

1 global inverse distance interpolation

2 local inverse distance interpolation

default: 0

G 19 **int** read a letter in front of the coordinates in the geo.dat file

0 OFF

1 ON

default: 0

G 20 **int** use automatic grid size

0 OFF

1 ON

default: 0

G 21 **double** Margins for automatic grid size $x_{start}, y_{start}, z_{start}$

default: 0.0 ; 0.0 ; 0.0

G 22 **double** Margins for automatic grid size $x_{end}, y_{end}, z_{end}$

default: 0.0 ; 0.0 ; 0.0

G 23 **int** reverse sign of vertical coordinate in geo.dat file

0 OFF

1 ON

default: 0

G 24 **double** raise topography above the level h by dz

default: 0.0 ; 0.0

G 25 **double** multiply topography above the level h by factor fz

default: 0.0 ; 0.0

G 31 **int** Number of smoothing iterations

default: 0

G 32 **double** Factor for topography data smoothing

default: 0.5

G 35 **double** Factor for data inverse distance

default: 16.0

G 41 **int** print SWAN bottom file from interpolated geo points

0 OFF

1 ON

default: 0

1.6 M :: MPI

M 10 *int* Number of processes

default: 1

M 11 *int* Partition in x-direction

0 OFF

1 ON

default: 1

M 12 *int* Partition in y-direction

0 OFF

1 ON

default: 1

M 13 *int* Partition in z-direction

0 OFF

1 ON

default: 0

M 20 *int* Decomposition method

1 Standard rectangular base domain

2 Improved rectangular base domain

default: 1

M 31 *double* Variance parameter for decomposition method 2

default: 0.1

1.7 O :: Objects

O 10 * *double* rectangular object; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

O 32 * *double* cylinder in y-direction; $x_{center}, z_{center}, radius$

default: 0.0 ; 0.0 ; 0.0

O 33 * **double** cylinder in z-direction; $x_{center}, y_{center}, radius$

default: 0.0 ; 0.0 ; 0.0

O 61 * **double** wedge object; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

1.8 S :: Solid

S 1 **int** read STL file and generate solid

IMPORTANT: the STL file needs to be in ASCII format! Most CAD programs export to a binary STL file. It is possible to use e.g. Paraview for STL conversion from binary to ASCII.

0 OFF

1 ON

default: 0

S 2 **int** auto-generate mesh extend based on STL max/min coordinates

0 OFF

1 ON

default: 0

S 3 **double** margins for auto-generated mesh $x_{m_{start}}, x_{m_{end}}, y_{m_{start}}, y_{m_{end}}, z_{m_{start}}, z_{m_{end}}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 4 **double** Scale STL geometry

default: 1.0

S 5 **double** 3D rotation; $x_{origin}, y_{origin}, z_{origin}, \phi, \theta, \psi$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 6 **int** print transformed STL model to "REEF3D_Solid.stl"

0 OFF

1 ON

default: 0

S 7 **double** change origin of STL model dx, dy, dz

default: 0.0 ; 0.0 ; 0.0

S 8 **double** Turn STL geometry in horizontal xy-plane in degree $^{\circ}$

default: 0.0

S 9 **int** Invert inside/outside for STL geometry

1 regular

2 invert

default: 1

S 10 * **double** rectangular object; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 11 * **double** rectangular object array; $x_{origin}, y_{origin}, z_{origin}$, box length L, gap G, number of objects in each direction n_i, n_j, n_k

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 32 * **double** cylinder in y-direction; $x_{center}, z_{center}, radius$

default: 0.0 ; 0.0 ; 0.0

S 33 * **double** cylinder in z-direction; $x_{center}, y_{center}, radius$

default: 0.0 ; 0.0 ; 0.0

S 34 * **double** cylinder with flexible orientation and front face orthogonal to x-plane

$x_{start}, y_{start}, z_{start}, radius_{start}, x_{end}, y_{end}, z_{end}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 35 * **double** cylinder with flexible orientation and front face orthogonal to y-plane

$x_{start}, y_{start}, z_{start}, radius_{start}, x_{end}, y_{end}, z_{end}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 36 * **double** cylinder with flexible orientation and front face orthogonal to z-plane

$x_{start}, y_{start}, z_{start}, radius_{start}, x_{end}, y_{end}, z_{end}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 37 * **double** cylinder with flexible orientation and front face orthogonal to the cylinder axis

$x_{start}, y_{start}, z_{start}, radius_{start}, x_{end}, y_{end}, z_{end}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 38 * **double** cylinder with flexible orientation and a vertical front face in line with the cylinder axis

$x_{start}, y_{start}, z_{start}, radius_{start}, x_{end}, y_{end}, z_{end}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 41 * **double** cone in x-direction; $y_{center}, z_{center}, x_{start}, x_{end}, radius_{start}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 42 * **double** cone in y-direction; $x_{center}, z_{center}, y_{start}, y_{end}, radius_{start}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 43 * **double** cone in z-direction; $x_{center}, y_{center}, z_{start}, z_{end}, radius_{start}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 51 * **double** sphere; $x_{center}, y_{center}, z_{center}, radius$

default: 0.0 ; 0.0 ; 0.0 ; 0.0

S 52 * **double** ellipsoid; $x_{center}, y_{center}, z_{center}, a_{axis}, b_{axis}, c_{axis}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 53 * **double** semi ellipsoid with vertical base; $x_{center}, y_{center}, z_{center}, a_{axis}, b_{axis}, c_{axis}, h_{base}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 54 * **double** semi ellipsoid with vertical base with rotation around the center;

$x_{center}, y_{center}, z_{center}, a_{axis}, b_{axis}, c_{axis}, h_{base}, \phi, \theta, \psi$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 61 * **double** wedge object in x-direction; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 62 * **double** wedge object in y-direction; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 63 * **double** wedge object in z-direction; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 81 * **double** tetrahedon object, each of the 4 points is given by the coordinates $x_1, y_1, z_1, x_2, y_2, z_2, x_3, y_3, z_3, x_4, y_4, z_4$

default: [4x] 0.0 ; 0.0 ; 0.0

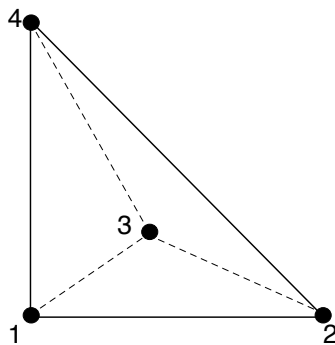


Figure 1.2: Definition of the tetrahedon points.

S 82 * **double** pyramid object, each of the 5 points is given by the coordinates $x_1, y_1, z_1, x_2, y_2, z_2, x_3, y_3, z_3, x_4, y_4, z_4, x_5, y_5, z_5$

default: [5x] 0.0 ; 0.0 ; 0.0

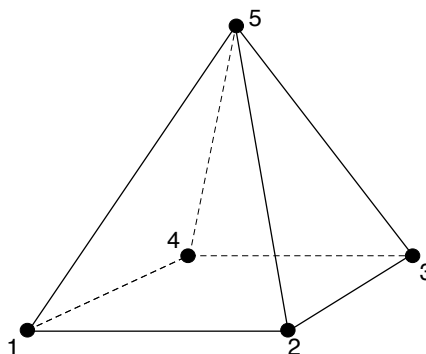


Figure 1.3: Definition of the pyramid points.

S 83 * **double** wedge object, each of the 6 points is given by the coordinates $x_1, y_1, z_1, x_2, y_2, z_2, x_3, y_3, z_3, x_4, y_4, z_4, x_5, y_5, z_5, x_6, y_6, z_6$

default: [6x] 0.0 ; 0.0 ; 0.0

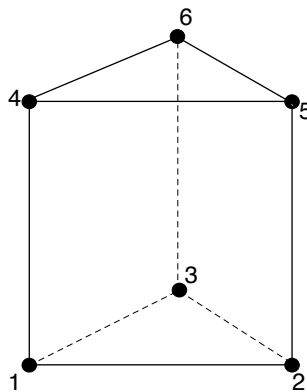


Figure 1.4: Definition of the wedge points.

S 84 * **double** hexahedron object, each of the 8 points is given by the coordinates $x_1, y_1, z_1, x_2, y_2, z_2, x_3, y_3, z_3, x_4, y_4, z_4, x_5, y_5, z_5, x_6, y_6, z_6, x_7, y_7, z_7, x_8, y_8, z_8$

default: [8x] 0.0 ; 0.0 ; 0.0

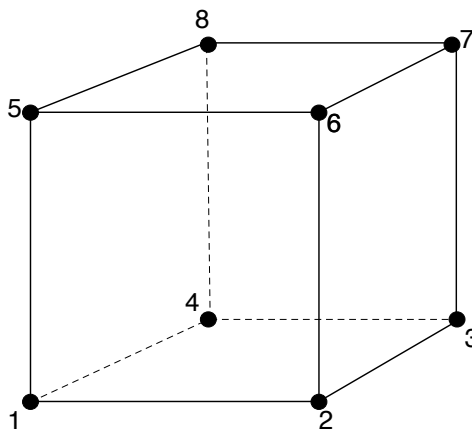


Figure 1.5: Definition of the hexahedron points.

S 121 * **double** vertical ogee weir, coordinates of upstream bottom corner, width, downstream height and hydraulic head x, y, z, b, P_d, H_0

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 122 * **double** vertical ogee weir, K, n, x_c and y_c

default: 0.5 ; 1.85 ; 0.22 ; 0.075

S 123 * **double** vertical ogee weir, R_1 and R_2

default: 0.45 ; 0.2

S 131 * **double** semi-circular cylinder in y-direction; $x_c, z_c, y_{start}, y_{end}, radius_{start}, radius_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 141 * **double** arch bridge; $x_{start}, x_{end}, y_{start}, y_{end}, z_{start}, z_{end}, radius$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 201 * **double** thin plate x-normal; $x_{location}, y_{start}, y_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 202 * **double** thin plate y-normal; $y_{location}, x_{start}, x_{end}, z_{start}, z_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0

S 203 * **double** thin plate z-normal; $z_{location}, x_{start}, x_{end}, y_{start}, y_{end}$

default: 0.0 ; 0.0 ; 0.0 ; 0.0 ; 0.0