



# **Dist2Walls Documentation**

## ***Release 3.2***

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## PREAMBLE

Dist2Walls gathers efficient algorithms for computing the distance fields for arrays (as defined in Converter documentation) or for CGNS/python tree (pyTrees).

This module is part of Cassiopee, a free open-source pre- and post-processor for CFD simulations.

For use with the array interface, you have to import Dist2Walls module:

```
import Dist2Walls
```

For use with the pyTree interface:

```
import Dist2Walls.PyTree
```



## LIST OF FUNCTIONS

### – Wall distance computation

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*Dist2Walls.distance2Walls*(zones, bodies[, ...])    Compute distance to walls.

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## CONTENTS

### 3.1 Wall distance computation

`Dist2Walls.distance2Walls` (*a*, *bodies*, *type='ortho'*, *loc='centers'*, *signed=0*,  
*dim=3*)

Computes the distance field from a set of bodies. compute the distance field located at nodes or centers of zone *a* (or zones in *A*), provided a list of surfaces defining the bodies to which the distance is computed.

Two algorithms are available:

- *type='ortho'* means a distance computed by an orthogonal projection to the surface faces defined by bodies.
- *type='mininterf'* returns the minimum distance of the point to the vertices of bodies.

If *loc='nodes'*, returns a distance computed at nodes of *a* (*A*), else if *loc='centers'*, distance is computed at cell centers of *a* (*A*).

Parameter '*signed*'=1 enables to compute a signed distance (negative inside bodies). When using signed distances, each body in *bodies* list must be a closed and watertight surface. In array version, *cellnbodies* provides the '*cellN*' field for any vertex in bodies. Default value is 1. The algorithm '*ortho*' does not take into account a body face if *cellN*=0 for all the vertices of that face. The algorithm '*mininterf*' does not compute the distance to a vertex of *cellN*=0.

#### Parameters

- **a** (*[array, list of arrays]* or *[pyTree, base, zone, list of zones]*) – input data
- **bodies** (*[array, list of arrays]* or *[pyTree, base, zone, list of zones]*) – body definition
- **type** (*string*) – type of wall distance computation in ['ortho', 'mininterf']
- **loc** (*string*) – location of distance field in ['nodes', 'centers']

- **signed** (*int*) – if 0 absolute distance, if 1 signed distance (negative inside)

In the pyTree version, 'cellN' variable must be stored in bodies directly. If loc='nodes', the distance field is stored as a 'TurbulentDistance' field located at nodes, and if loc='centers', it is stored in nodes located at centers.

Exists also as an in-place version (`_distance2Walls`) that modifies a and returns None.

*Example of use:*

- Compute distance to walls (array):

```
# - distance2Walls (array) -
import Dist2Walls
import Generator as G
import Converter as C
import Geom as D

# Bloc dont on cherche la distance a la paroi
a = G.cart((0.,0.,0.), (0.1,0.1,0.1), (10,10,10))

# Paroi
sphere = D.sphere((1.2,0.,0.), 0.2, 30)
cellN = C.initVars(sphere, 'cellN', 1.)
# Calcul de la distance a la paroi
dist = Dist2Walls.distance2Walls(a, [sphere], cellnbodies=[cellN],
                                loc='centers', type='ortho')

ac = C.node2Center(a)
ac = C.addVars([ac, dist])
C.convertArrays2File([ac], 'out.plt')
```

- Compute distance to walls (pyTree):

```
# - distance2Walls (pyTree) -
import Dist2Walls.PyTree as Dist2Walls
import Generator.PyTree as G
import Converter.PyTree as C
import Geom.PyTree as D

a = G.cart((0.,0.,0.), (0.1,0.1,0.1), (10,10,10))
sphere = D.sphere((1.2,0.,0.), 0.2, 100)
t = C.newPyTree(['Base', a])
t = Dist2Walls.distance2Walls(t, sphere)
C.convertPyTree2File(t, 'out.cgns')
```

## INDICES AND TABLES

- genindex
- modindex
- search