**“ply2SPHERA\_perimeter v.2.0”: documentation file**

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under the Contract Agreement between RSE SpA and the Italian Ministry of Economic Development for the RdS period 2015-2017, in compliance with the Decree of 21 April 2016. Reference project: ‘A.5 - Sicurezza e vulnerabilità del sistema elettrico’, Frigerio A. et al., 2015–2018.

## Description and references

“ply2SPHERA\_perimeter v.2.0” (RSE SpA) is a minor pre-processing tool of the SPH code SPHERA v.8.0 (RSE SpA). It deals with the format conversion from “.ply” to the format of the sections “VERTICES” and “FACES” of SPHERA main input file to describe the perimeter of a 3D zone (for 3D simulations) or a 2D zone (for 2D simulations).

With Copyright 2016-2018 (RSE SpA), “ply2SPHERA\_perimeter v.2.0” is written by Andrea Amicarelli (email address: andrea.amicarelli@rse-web.it).

“ply2SPHERA\_perimeter v.2.0” is free software released under the GNU General Public License (Free Software Foundation).

## Notes

The “.ply” input file is located in the working directory. Here, there is also the main input file of ply2SPHERA\_perimeter v.2.0: ply2SPHERA\_perimeter.inp. This is composed by 3 lines, with the following structure:

<integer\_1> <integer\_2> <integer\_3> ! perimeter\_first\_vertex\_ID (ID of the first vertex of the perimeter); perimeter\_first\_face\_ID (ID of the first face of the perimeter); perimeter\_ID (ID of the perimeter)

<real> ! z\_offset (offset of the z-coordinate)

<character> ! ply\_file\_name (name of the .ply input file)

## Tutorials

ply2SPHERA\_perimeter v.2.0 is validated on 4 tutorials (following sub-sections), each one having possible variants. Some of the tutorials are published on International Journals and were also carried out with previous versions of the code. Other minor test cases only represent very simple configurations.

## “db\_Alpe\_Gera”

This tutorial is completely described in Amicarelli & Agate (2017, [5]). This project report is Open-Access and also includes a synthetic English version.

## “db\_Alpe\_Gera\_Lanzada\_substations”

This tutorial is completely described in Amicarelli (2018, [1]). This project report is Open-Access and also includes a synthetic English version.

## “edb\_ICOLD”

This tutorial is completely described in Amicarelli et al. (2017, [4]). The paper version available on ResearchGate might help in case the published version is unavailable.

## “spherical\_Couette\_flows”

This tutorial is described in Amicarelli et al. (2016, SPHERIC, [3]). The tutorial is also available on Amicarelli & Agate (2016, RdS, [2]). This project report is Open-Access and also includes a synthetic English version.

## References

1. Amicarelli A., 2018; Modellazione fluidodinamica SPH 3D per la propagazione di inondazioni in ambiente urbano e valutazioni di supporto ai fini della gestione del sistema elettrico in aree soggette a rischio idrogeologico; RSE SpA, Ricerca di Sistema, Deliverable 18001519.
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3. Amicarelli A.; G. Agate, B. Stefanova, S. Sibilla, J. Grabe; 2016; A SPH model for dike overtopping and dam liquefaction with bed-load transport, bottom drag and mobile boundaries; 11th SPHERIC ERCOFTAC International Workshop SPHERIC 2016 – ERCOFTACT Conference, pp.424-431, Garching (Munich, Germany); ISBN: 9783000533587.
4. Amicarelli A., B. Kocak, S. Sibilla, J. Grabe; 2017; A 3D Smoothed Particle Hydrodynamics model for erosional dam-break floods; International Journal of Computational Fluid Dynamics, 31(10):413-434; DOI 10.1080/10618562.2017.1422731
5. Amicarelli A., G. Agate; 2017; Modellazione fluidodinamica SPH per la propagazione di inondazioni in presenza di opere di protezione; RSE SpA, Ricerca di Sistema, Deliverable 17002102.
6. Paraview (Kitware), https://github.com/Kitware/ParaView