"Grid Interpolator v.2.0": documentation file

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"The minor tool "Grid Interpolator v.2.0" is realised by RSE SpA thanks to the funding "Fondo di Ricerca per il Sistema Elettrico" within the frame of a Program Agreement between RSE SpA and the Italian Ministry of Economic Development (Ministero dello Sviluppo Economico)."

3. Acknowledgments

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- ✓ under the Contract Agreement between RSE SpA and the Italian Ministry of Economic Development for the of RdS period 2012-2014, in compliance with the Decree of November 9, 2012.
- ✓ 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.

4. Description and references

"Grid Interpolator v.2.0" (RSE SpA) reads a 3D field of values from an input grid and interpolates them on an output grid with a different spatial resolution. The input file is a xyz file (with two additional ad-hoc lines at the beginning). The output field is available in both the file formats xyz and DEM. This tool is also useful to post-process the 2D fields of the maximum specific height and the maximum water depth as estimated by SPHERA v.9.0.0 (RSE SpA).

With Copyright 2016-2018 (RSE SpA), "Grid Interpolator v.2.0" is written by Andrea Amicarelli (email address: andrea.amicarelli@rse-web.it).

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5. Notes

Two additional lines are reported at the beginning of the xyz input file "input_field.prn", as in the following example:
"

n_points_in	x_min	y_min	z_min	x_max	y_max	z_max	dx_out	dy_out	dz_out
21822	1152.77000	71.07100	0.00000	25779.70000	9926.20000	1.00000	9.47609	9.47609	1.00000

"

with the following parameter definition:

- n_points_in: number of points in the input file;
- x_min: minimum x-coordinate;
- y_min: minimum y-coordinate;
- z_min: minimum z-coordinate;
- x_max: maximum x-coordinate;
- y_max: maximum y-coordinate;
- z_max: maximum z-coordinate;
- dx_out: spatial resolution of the output field along the x-axis direction;
- dy_out: spatial resolution of the output field along the y-axis direction;
- dz_out: spatial resolution of the output field along the z-axis direction.

The format of the first additional line does not alter the tool execution.

Fortran format specifier of the second additional line is '(i12,9(g12.5))' .

6. Tutorials

Grid Interpolator v.2.0 is validated on 3 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.

6.1."db_Alpe_Gera"

This tutorial is completely described in Amicarelli & Agate (2017, [3]). This project report is Open-Access and also includes a synthetic English version.

6.2."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.

6.3. "edb_ICOLD"

This tutorial is completely described in Amicarelli et al. (2017, [2]). The paper version available on ResearchGate might help in case the published version is unavailable.

7. 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.
2. 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
3. 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.