HydRA setup

In this section, an example of how to run HydRA is illustrated. The procedure is described for a Windows operative system; however, it can be considered valid also for other operative systems with some appropriate modifications. HydRA needs two software dependencies to run (Java SE Runtime Environment and the TCL/TK language) and in the following procedure it is explained how to check if they are already present on the system or they have to be installed.

Step 1. *Check the presence of the Java SE Runtime Environment or install it.*
Open the command prompt and type *java –version*. If the version of Java is returned it is possible to go to the next step. Otherwise, download the last version for your operative system of the Java SE Runtime Environment from the Oracle web site (http://www.oracle.com/technetwork/java/javase/downloads/jre8-downloads-2133155.html, last check on February 26th, 2017).

Fig. 1: Check the version of Java SE Runtime Environment.

Step 2. *Check the presence of the TCL/TK interpreter.*
Open the command prompt and type in sequence this two command: *tclsh* and then *puts $tcl_version*. If the version of TCL is returned it is possible to go to the next step. Otherwise, you can download the TCL/TK interpreter from the Download section of the OpenSees web site (http://opensees.berkeley.edu/, last check on February 26th, 2017).

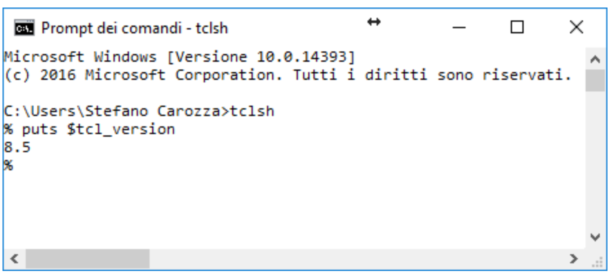

Fig. 2: Check the version of TCL/TK interpreter.

Step 3. *File and folders preparation.*
Create two folders, in example *D:\Data\analysis* and *D:\Data\output*. Put the Java archive *HydRA.jar,* the input file of the analysis (e.g., the ones named *input.txt* proposed in the section 0) and the OpenSees executable file *OpenSees.exe* (it is

possible to download it from the same website reported in the Step 2) inside the folder *analysis*.

Step 4. *Run the analysis.*

Open the command prompt, move to the *analysis* folder and type *java –jar HydRA.jar input.txt* and see the analysis progress. At the end of the analysis, it is possible to open the output files in the *output* folders.

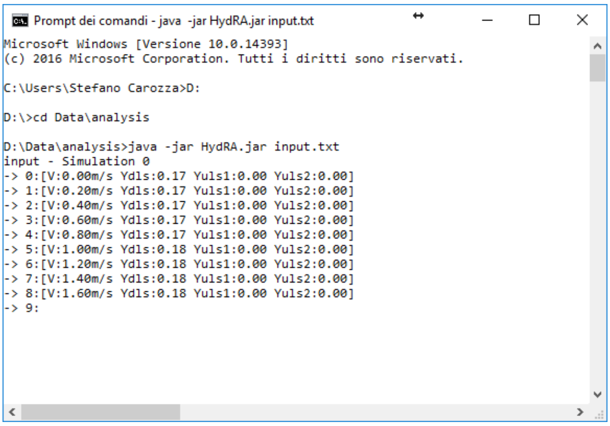

Fig. 3: Analysis progress.

Example of implementation of a complete input file

The code proposed in the following example refers to a realistic analysis case. It is possible to copy and paste the code in a text file, save it as (for example) *input.txt* and use it as specified in the following section. It is worth noting that, before the use, it is necessary to adjust the pathnames for the analysis and output folders.

```
# -------------------------------------------------------------------------
# Object                  : EXAMPLE OF IMPLEMENTATION
# Last modify                : November, 22th 2016
# Author         : Stefano Carozza (stefano.carozza@unina.it)
# Affiliation    : DiSt, University of Naples "Federico II"
# -------------------------------------------------------------------------
```

```
# -----------------------------------------------------------------------
# ANALYSIS DEFINITION
# -----------------------------------------------------------------------
analysis -wall -uncertainties 50 D:\Data\analysis\ D:\Data\output\;
load -hydro -IM -V|H 1000;
load -hydro -step 500;
limitstates 1 0 0.9;

# -----------------------------------------------------------------------
# MATERIAL DEFINITION
# -----------------------------------------------------------------------
masonry -E -uniform 690 1220;
masonry -gamma -uniform 16.0E-6 19E-6;
masonry -fc -uniform 0.5 2.0;
masonry -ft -uniform 0.10 0.5;
masonry -tau0 -uniform 0.15 0.5;
masonry -correlation 0.4 0.4 0.4 0.4 0.4 0.4;

# -----------------------------------------------------------------------
# GEOMETRY DEFINITION
# -----------------------------------------------------------------------
geom -length -lognormal 5000 0.25;
geom -height -uniform 3300 4300;
geom -thickness -uniform 400 600;
geom -internalspan -uniform 4000 5000;
opening -doorwidth -uniform 1200 1400;
opening -doorheight -uniform 2000 2400;
opening -windwidth -uniform 900 1400;
opening -windheightfb -uniform 800 1100;
opening -openrate -fixed 0.25;
opening -doorsrate -fixed 0.50;

# -----------------------------------------------------------------------
# LOADS DEFINITION
# -----------------------------------------------------------------------
load -floor -lognormal 8.0 0.3;
load -floorSpan -uniform 4000 5000;
load -floorRate -lognormal 0.5 0.3;
load -gammaflow -lognormal 14E-6 0.1;
load -hydrodynamic -drag -uniform 1.0 1.2;
load -hydrodynamic -azimuth -uniform 0.0 1.57;
load -hydrodynamic -friction -fixed 0.5;
load -hydro -rate 1.0 1.0;

# -----------------------------------------------------------------------
# COSTRAINTS DEFINITION
# -----------------------------------------------------------------------
costraint -lateral 0.5 8.0;
costraint -floors 0.5;

# -----------------------------------------------------------------------
# OTHER DEFINITIONS
# -----------------------------------------------------------------------
mesh 200 200;
```