

## Versions history

The following versions of SIMU-CIC have been issued:

Version	Date	See note...
<b>1.0.1</b>	2018-11-28	
<b>1.1.1</b>	2019-12-20	
<b>1.2.0</b>	2020-09-28	1
<b>1.2.1</b>	2021-08-02	1
<b>1.3.0</b>	2022-10-11	2
<b>1.4.0 (current)</b>	2024-03-11	3

Notes:

- (1) Versions 1.2.0 and 1.2.1 are similar. The difference concerns spacecraft models: there are more spacecraft models available in version 1.2.1.  
These versions can be used with all Scilab versions  $\geq 6.0.2$ . For Scilab 6.1.1, the following workaround must be applied: Type `scf()` in the Scilab console before loading Simu-CIC.
- (2) Version 1.3.0 is compatible with all Scilab versions  $\geq 6.0.2$ , including Scilab 6.1.1.
- (3) Preferred Scilab version is 2024.0.0, but 6.0.2 is also fine (intermediate versions as well).  
Preferred CelestLab version is 3.5.0.  
Provided zip file is compatible with Windows 64bits OS.

For more details about the installation procedure in particular, look at the user manual (SIMU-CIC\_User\_Manual.pdf), located in the “doc” sub-directory.

## Major changes between versions 1.3.0 and 1.4.0

- GUI:
  - Updated labels in the “Attitude” tab:
    - “Attitude laws” is now called “Satellite modes”.
    - “Attitude sequence” is now called “Mode sequence”
  - A new document containing spacecraft models can be displayed (see help menu and spacecraft tab)
  - The simulation duration can now be set in days or seconds.
- New CIC files:
  - `Sat_SATELLITE_ANGULAR_VELOCITY.TXT`  
-> Angular velocity vector of the spacecraft relative to the ICRF reference frame (coordinates in same frame).
  - `Sat_SATELLITE_ANGULAR_ACCELERATION.TXT`  
-> Angular acceleration vector of the spacecraft relative to the ICRF reference frame (coordinates in same frame).
  - `Sat_QUATERNION_EARTH_ROTATION.TXT`  
-> Quaternion describing the transformation from ICRF to ECEF (Earth Centered Earth Fixed) reference frames.
  - `Sat_INITIAL_ORBIT_PARAMETERS.TXT`  
-> Initial osculating orbital elements in ICRF reference frame.
- Output file “simu\_cic\_info.txt” contains additional information:
  - Initial osculating orbital elements.
  - Ground stations geographical coordinates and minimal elevation angles.

- o Ground stations visibility durations.
- o Satellite modes and corresponding fraction of simulation time.
- o Sun visibility and corresponding fraction of simulation time.
- Input orbit ephemeris files can now contain position vectors only (velocity vectors are then obtained by interpolation).
- A new plot has been added: angular velocity vector coordinates.
- Computation of attitude transitions:
  - o Slight improvement of the algorithm (better detection of non-convergence situations)
  - o Additional messages and warnings are displayed in the Scilab console.

## Major changes between versions 1.2.1 and 1.3.0

- CIC outputs:
  - o New CIC file generated: *Sat\_RELATIVE\_VELOCITY-SATELLITE\_FRAME.TXT*  
It gives the coordinates of the velocity vector relative to Earth (hence "relative") in the spacecraft frame.
  - o Changes in *Sat\_SATELLITE\_MODES.TXT* and *Sat\_SATELLITE\_ATTITUDE\_MODE.TXT*:  
Depending on the values of the maximum angular velocity and angular acceleration (see Specacraft -> Platform tab), intermediate attitudes may be generated. These are denoted by :
    - the name **[SLEW]** in *Sat\_SATELLITE\_MODES.TXT*
    - the code (or mode) **-99** in *Sat\_SATELLITE\_ATTITUDE\_MODE.TXT*

## Major changes between versions 1.1.1 and 1.2.1

- Interfaces/GUI:
  - o Command-line interfaces added to control the GUI via scripts.
  - o Test procedure updated thanks to the scripting interface.
  - o Scripting examples added.
  - o Updated console menu.
  - o Updated labels and messages.
  - o Updated examples.
- Orbit properties:
  - o Updated definition of orbit number, now based on true argument of latitude.
- Attitude:
  - o Elementary condition on longitude added.
  - o Elementary condition on orbit number added (configurable reference argument of latitude).
  - o Custom elementary condition and attitude law added (definition via files).
  - o Attitude sequence constraints added (to avoid quaternion discontinuities).
  - o Some attitude laws renamed to make them more concise.
- CIC outputs:
  - o "DISTANCE\_SAT\_GROUND\_STATION" replaced by "DISTANCE\_GROUND\_STATION" in accordance with the CIC protocol.
  - o "SATELLITE\_ECLIPSE\_MOON" and "QUATERNION\_SA\_\*" are now compliant with the CIC protocol.
  - o Version of CIC files is now 2.0.

- o "POS\_GROUND\_STATION\_\*\_IN\_ANTENNA\_\*" replaced by "GROUND\_STATION\_\*\_DIRECTION-SATELLITE\_FRAME". Bug fixed causing comments to not always correspond to the correct ground station.
- o "POS\_SAT\_IN\_GROUND\_STATION\_\*" replaced by " SATELLITE\_DIRECTION-GROUND\_STATION\_\*\_FRAME" (to be compatible with next CIC protocol update). Comments now clearly indicate the clockwise azimuth convention in station frame.
- Graphs:
  - o Updated graphs: ground stations visibility
  - o Trajectory relative to ECI/ECF added.
- Miscellaneous
  - o Various general improvements.
  - o Slight changes of the examples.
  - o New script examples.