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Free CNES Flight Dynamics Tools

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For numerous years, CNES Flight Dynamics teams have made freely available some astrodynamics tools and libraries as MSLIB library. Nevertheless, these tools, essentially coded in Fortran language needed different versions of compilation depending on used platforms (Solaris, Linux, Windows …) which didn't ease its installation and therefore limit their dissemination. Some years ago, CNES astrodynamics subdirectorate made the decision to switch to Java language in particular to insure portability whatever the target machine was. As a consequence old generation astrodynamics tools were translated to Java and improved on the process. Moreover, and as a consequence of the new language, these new tools (or new versions of tools) became more easily exportable keeping them available as freely available tools and libraries. The translation and improvement effort includes both low-level libraries as PATRIUS or GENIUS and more sophisticated tools with their own Graphic User Interface (GUI) as PSIMU.

This paper will describe these different tools and libraries always linked to Flight Dynamics applications, their interaction and dependency as well as their dissemination mode (open source, freeware).

Initially we will describe low-level libraries as PATRIUS uniquely devoted to Flight dynamics aspects and GENIUS for scientific GUI development. Secondly we will also present GENOPUS library which is based on both previous ones and allows providing "intelligent" widgets as the one used for defining orbit parameters.

Then, we will present some tools based on these building blocks as PSIMU (for any kind of trajectory extrapolation around Earth) or MIPELEC (optimization of low thrust propulsion). We will also give as example, tools used in operational contexts as ELECTRA.

To finish, means to get and use these tools will be described via the CNES Web site, their licenses, Wikis (including tutorials and Javadoc) or even training course.

Summary

This paper will describe different Java Flight Dynamics tools proposed by CNES in a free delivery mode (open source, freeware). These tools may be low-level libraries (PATRIUS, GENIUS) as well as more sophisticated ones (PSIMU) which are fully portable and therefore easily usable both for studies and operational activities.

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