

DOCKS – An open-source software suite for space mission profiles

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At CENSUS, the space pole of PSL Université hosted at the Paris Observatory, we are developing an open-source software suite called DOCKS for analyzing scientific nanosatellite mission profiles. DOCKS is a Python-based software that computes the major contributors in the system budget for the probe's entire mission profile, i.e., trajectory, intervisibility with sun and ground stations, onboard data volume, pointings and power budget. It will be composed of seven thoroughly validated modules, which can also be used as standalone. An additional advantage of DOCKS is that it is compatible with VTS, the French space agency's (CNES) software for visualizing and animating satellites in a 3d simulation.

So far, three modules have been developed: the deep-space trajectory Propagator, Intervisibility, and Energy Power Simulator (EPS). These are operational and are regularly updated on the public GitLab with new features and improvements based on user feedback. The most recent development in DOCKS is the fully operational remote service from our servers, which has been extensively tested by internal users. Besides, the propagator has been improved by the addition of an efficient adaptive-step integrator, IAS15, for trajectory propagation and a time-step manager to handle continuous propulsion burns. The talk will cover the latest developments in DOCKS along with our future perspectives. Furthermore, CENSUS also provides Model-Based System Engineering (MBSE) support to various CubeSat projects in the early phases of mission profile modelling, so the use of DOCKS in this context will also be presented.

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