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# PARAMETRIC TOOL FOR THE THERMAL ANALYSIS OF A SATELLITE.

**Abstract**

The work here summarized presents the development of a new tool for the thermal analysis of small satellites, whose main feature is the strong geometrical and thermal parametrization. The work has been conceived within the 3STAR Project of the ASSET Research Group of the Politecnico di Torino. The 3STAR Project is part of an initiative of the ESA Education Office named GEOID. The objective of the project is the development of an international space mission by european universities which will be made up by a constellation of cubesat in a Low Earth Orbit (LEO) orbit, which main goal will be the validation of the Global Educational Network for Satellite Operations (GENSO), which is a ground stations network. The strong link with this students' project led to the idea of developing a tool characterized by low complexity and costs, able to give preliminary results on the thermal behavior of the system when the final configuration is not finalized, allowing to perform a sensibility analysis with respect to some geometrical parameters such as the electronic boards and heat sources positioning. The tool is made up by a MatLab code whose functions are: • Reading the geometry and mesh. • Perform the thermal analysis on the basis of the internal and external heat fluxes set by the user. • Provide an output file with the thermal history. Because of the low cost requirement, the software has been conceived to interface with open software. In particular, concerning the mesh, the code reads the mesh output format of GMesh, an open software that allows to create 3D geometries and to mesh them. Concerning the output, the code is able to write an output file compatible with ParaView, an open-source data analysis and visualisation tool. The result is a tool that is useful not only during the design verification phase, but also during the preliminary design phase, allowing to study the effects on the thermal behavior of the system due to the geometry variation. The code has been applied to the 3STAR case study, and validated with AnSys software for what concerns the heat conduction calculation.