

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Upper Stages, Space Transfer, Entry and Landing Systems (3)

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## UPGRADES TO THE DARE PARACHUTE SIMULATION TOOLBOX

**Abstract**

The ParSim tool was originally developed as a parachute simulation tool for the student-built Stratos III project within Delft Aerospace Rocket Engineering (DARE). The objective of the program is to simulate the 2D trajectory of free-falling objects with or without parachutes. In order to perform a sensitivity analysis, the tool is capable of performing a grid search and a Monte Carlo.

ParSim V3 missed several features that have been implemented in version 4.0. These features include the drift of the vehicle due to the wind and aerothermal heating during re-entry. To enable these features, ParSim V4 was made to simulate 3D trajectories, whilst still assuming a constant angle of attack. Furthermore, several heat flux models have been implemented. ParSim V4 also includes updates in the parachute inflation model and now allows for reefing of parachutes to be considered.

ParSim V4 has been validated using reference missions. These include the same missions used for ParSim V3 but include some new missions that allow for validation of the new features.