DCAP
Dynamic and Control Analysis Package

DCAP is a no-frills, rational, fast multi-body software tool, designed for assessing space systems and devices.

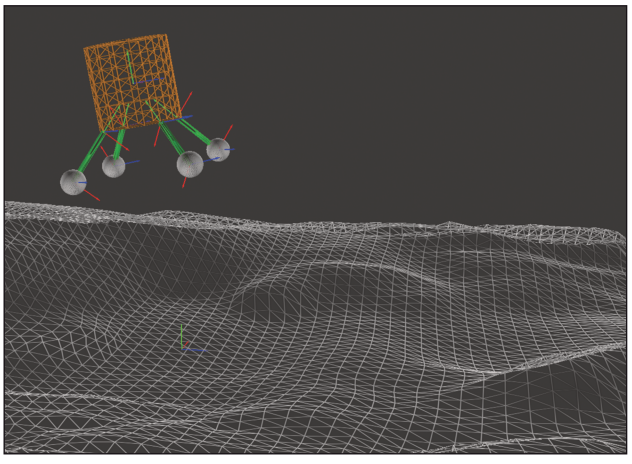
It is composed of a suite of fast, effective computer programs that provides the user with capability to model, simulate and analyse the dynamics of coupled rigid and flexible structural systems.

The DCAP dynamic formulation is based on a symbolic order(n) algorithm, which is extremely efficient for open loop topology system. This avoids the explicit computation of a system mass matrix and its inversion, and it results in a minimum-dimension formulation. A dedicated symbolic manipulation pre-processor is further used in the coding optimization in order to allow real-time simulations.

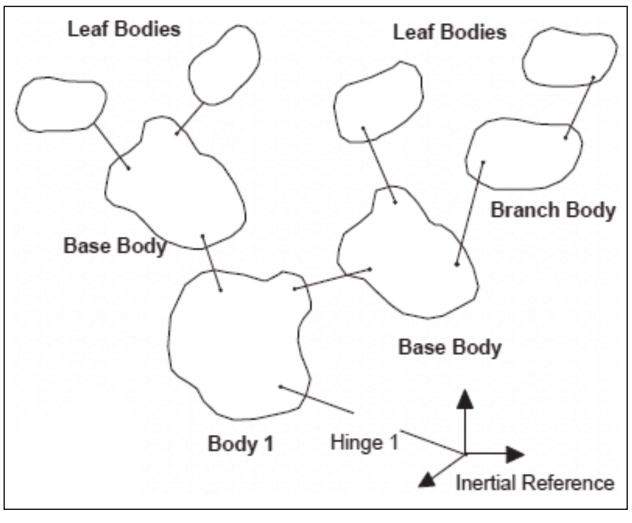
Relative motion between bodies is defined through “hinges”. Each hinge allows from zero to six relative degrees of freedom, as it can be free, locked or constrained to pre-defined motion.

Applications

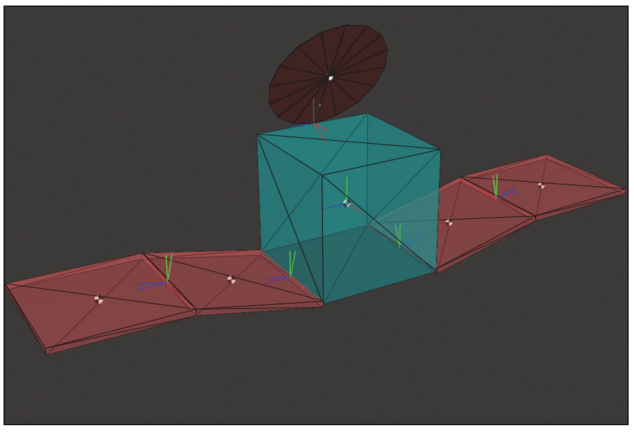
- Solar panel deployment mechanism
- Flexible antenna model
- Robotic arms
- Docking
- Grappling
- Space mechanisms
- Flexible launcher model
- Launcher lift-off phase
- Launcher thrust vector control
- Spacecraft attitude control
- Spacecraft separation system
- Landing scenario simulation
- Control moment gyroscope
- Reaction wheels



Contact dynamics for landing simulations



Open loop system topology



Solar panel deployment mechanism

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DCAP

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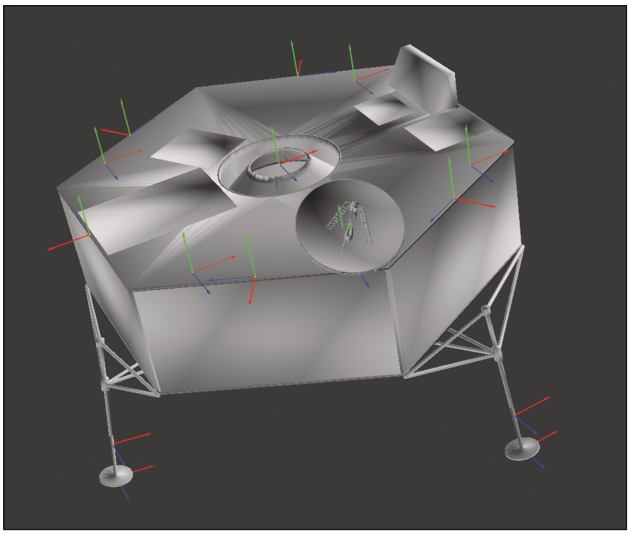
Key Features

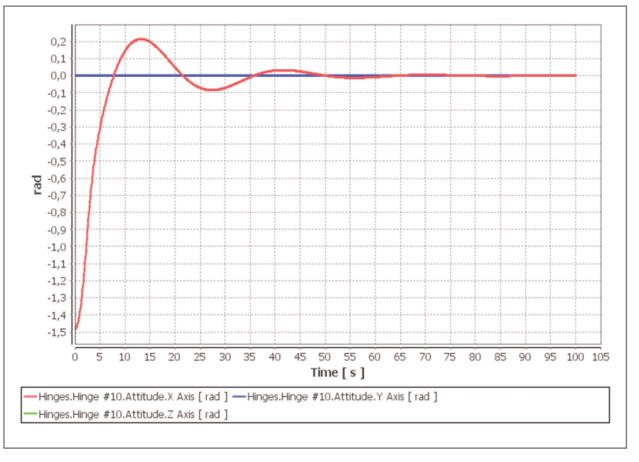
- Symbolic order(n) dynamic formulation
- Rigid and flexible bodies
- Analytic flexible beam model
- Transitions of hinge DOF state
- Variable body properties
- Gravity gradient
- Contact dynamics
- Friction dynamics
- Built-in space sensors and actuators
- Non-linear devices
- Graphical user interface
- Graphical pre and post processing



Spacecraft OBJ representation

Interfaces

- Generation of the mode shapes for ASTOS
- Coupling with Simulink® using DCAP GUI and MATLAB® scripts
- Flexible body model from MSC NASTRAN®



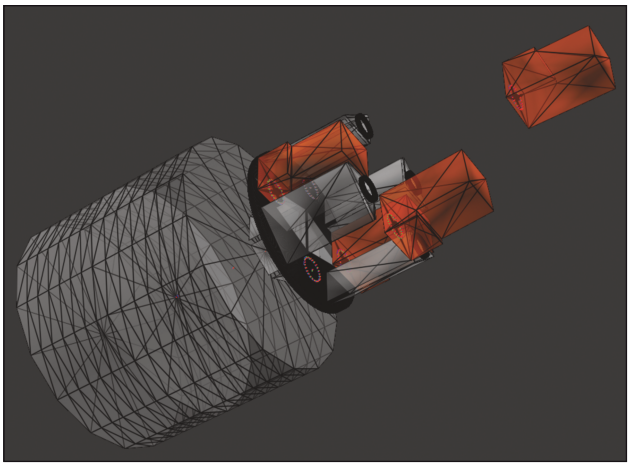
GUI post-processing view

Analysis

- Linear and non-linear time domain simulations
- Modal analysis

Visualization

- Data driven modelling solution via GUI
- Wavefront OBJ file for body rendering
- 2D plots
- 3D animation



Spacecraft separation system analysis

Availability

- Stand-alone software package or
- Coupled with ASTOS: the whole multi-body configuration is performed via the ASTOS GUI, DCAP provides the flexible multi-body dynamics
- Perpetual node locked or floating license
- 20 hours of remote support and
- Software updates for one year included
- 3-days training in Stuttgart, Germany
- Optional yearly maintenance renewal

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