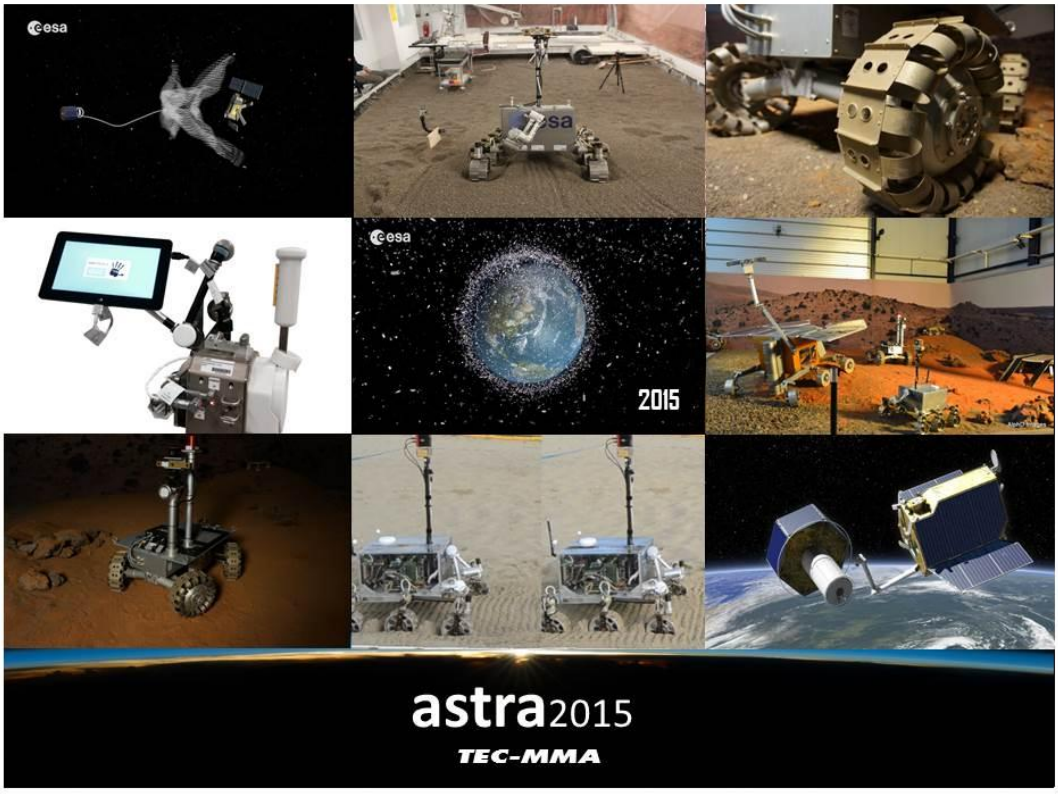
Abstract Book

ASTRA 2015



where the effect of system mass ratios to the change of the relative velocities will be quantified, and its significance discussed. Additionally, the behaviour of the systems under impact will be described, and the kinematic and dynamic requirements leading to a successful latching at the first impact will be identified. Simulation results will be presented that validate the proposed analytical approach.

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Poster 14

A Simulated Environment for the ISS Docking Procedure

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Since 2011 Romania is member of the European Space Agency (ESA) determining some research centers to refocus part of their research in the topics of interest related to the space applications and technologies. Within the DSSL (Dynamic Simulation Systems Laboratory) of the Technical University in Cluj-Napoca an on-going research project is focused on the development of an Instructor Operation Station (IOS) consisting of:

- a modular training device for elaborated solutions;
- a “visit card” for future space application and start-up modules;
- an experimental module for variable gravity conditions, designed as a stimulation tool for companies that develop space components and devices.

Being one of the promoters and users of the Siemens PLM portfolio of products the simulation tool for the different space events was developed using Siemens NX functions.

In direct correlation with the experimental model for variable gravity testing, a simulation of the docking maneuvers of the Dragon freight transporter onto the ISS (International Space Station) was developed. The trajectory data are used as inputs for the inverse dynamic model of a robotic structure which will generate the motion in an experimental scaled down model. The authors will present the road-map for the generation of this simulated environment and the proper use of the output data in an experimental setup of the IOS.

Experiment-training hardware is representative for the proposed TRL, as is built for each experiment. Prototype equipment is used during most procedures and the training process similar with what is called flight-type training hardware and therefore it must have the appearance of flight items and must work in all aspects that are apparent to the crewmen in using this hardware.

The equipment may be refurbished from different sources of production hardware that has been rejected because of minor imperfections or other components damage in a larger system. Material may be substituted in this hardware or internal components may be deleted from it if such changes do not affect the instructor or “crew” operations (i.e. internal electronics but not the controls and displays, may be deleted) for the initial development of the training process and hardware the baseline data could be computer generated or simulated. In some cases, the mass might be modified to simulate reduced gravity or to make handling of it practical in one-g conditions.

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