6th International Conference on Astrodynamics Tools and Techniques (ICATT)

Monday, 14 March 2016 - Thursday, 17 March 2016

Darmstadtium

Scientific Programme

The scientific program is composed of tutorials (March 14th) and tracks (March 15th, 16th, and 17th). As in previous editions, **ICATT** offers a series of tutorials. The tracks are composed of presentations.

01: Ascent

Ascent trajectories for expendable and reusable launch vehicles; computation of payload injection and deployment; branching and abort trajectories; launcher separation and boosters come back; safe trajectories and splash down of rocket stages; ascent from planets and Moons;

02: Loitering / Orbiting

Low Earth Orbits (LEO), Medium Earth Orbits (MEO), High Earth Orbits (HEO), Geostationary Orbits (GEO); station-keeping; optimization of loitering arcs; computation of drag-free orbits; circular and elliptical orbits around planets and Moons; resonant orbits and fuel efficient trajectories;

03: Satellite Constellations and Formations

Computation of trajectories where two or more spacecraft are involved; relative motion; computation of placement and replacement of satellites; launch analysis of formations and constellations; mega-constellations and its orbital slots; trailing formations; cluster formations; trajectories for fractionated spacecraft; constellations decay and orbital life;

04: Interplanetary Flight and Non-Earth Orbits

Interplanetary trajectories and fly-by; rendezvous with asteroids and comets; libration point transfers and orbits; resonant orbits; near-Earth objects trajectories; sample return missions; coverage of instruments and ground contacts; maintenance or orbital positions around planetary bodies; planetary tours and encounters;

05: Rendezvous and Docking

Rendezvous approach (far and close); computation of optimal phasing conditions; docking and mating; contact dynamics; berthing; in-orbit servicing; Docking in R-bar and V-bar; optimal ground contacts during rendezvous;

06: Low Thrust

Computation of low thrust orbits in any given mission arc; Optimal trajectories involving low thrust; Low Thrust Transfer to LEO and GEO;
Comparison of Electric and chemical Propulsion trajectories; Design and optimization of low thrust orbit transfers; Low thrust station keeping; Low thrust orbital transfers in the Two-Body problem;

07: Re-Entry and Aero-Assisted Maneuvers

Computation of planetary re-entry trajectories; optimal guidance; skipped and bounced trajectories; aerocapture, aerobraking, and aerogravity assist manoeuvres; Descent and landing trajectories; Re-targeting guidance; Hazard-avoidance trajectories;

08: Optimization and Dynamics

Trajectory design and optimization; multi-objective multi-disciplinary optimization; local and global optimization techniques; stability; dynamic systems theory; dynamical models; space flight mechanics mathematical foundations;

09: Environment Modelling

Gravity models; atmospheric models; magnetic models; solar radiation and solar wind pressure models; perturbations; Tools and techniques to model perturbations; Shielding analysis tools and radiation analysis tools and techniques; Meteoroid and space debris terrestrial environment databases;

10: Debris, Safety and Awareness

Nature friendly techniques; safe trajectories; disposal and recycling; sustainability; Clean Space astrodynamics tools and techniques; disposal of spacecraft; collision warning techniques and tools; debris population models; design for demise trajectories; prediction of debris fall out; footprints analysis; collision avoidance (risk computation, avoidance strategies, delta-v budget estimation); end of life disposal (orbital lifetime, GEO, LEO, ISS interference,...); tools for long-term environment;

11: Open Source Tools

Tools using any open source license; use and perspectives; core repositories and code re-use for astrodynamics computations; free use of astrodynamics code; code repositories; astrodynamics APPs and astrodynamics code running on smartphones and tablets;

12: Verification and Validation Methods

Methods to verify and validate tools, techniques, orbits, and models; comparison of tools; performance analysis of astrodynamics methods; quality and of software quality assurance of astrodynamics tools; independent verification and validation; validation checks that the product design satisfies or fits the intended use;

13: Orbit Determination and Prediction Techniques

Position and velocity prediction; ephemeris computations; conjunctions; numerical integration methods applied to astrodynamics; precise orbit determination for LEO, MEO, HEO, GEO missions; tools and technique for high precision orbit determination for planetary missions; observational data; parameter estimation; orbit determination with multiple tracking techniques;

14: Multidisciplinary Design Optimization

Recent multi-disciplinary design methods; commercial and non-commercial tools; aerodynamics, structural analysis, propulsion, control theory; Gradient-based and non gradient-based methods; decomposition methods, approximation methods, evolutionary algorithms, memetic algorithms, response surface methodology, reliability-based optimization, and multi-objective optimization approaches;

15: Students

Undergraduate MSc or PhD students to encourage them to share results from their research projects; Reserach fellows work in the area of astrodynamics tools and techniques;