

the role of the dissipation and the existence, location and stability character of the equilibria. In particular, we provide examples showing the occurrence of various dynamical phenomena such as: passage through the resonance, temporary capture into resonance, escape motions, trapped motions, shift of the equilibria during a Solar cycle, etc.

This talk refers to some works in collaboration with Alessandra Celletti.

Juan Luis Gonzalo Gomez (Politecnico di Milano, Italy)

Collision avoidance manoeuvre design and application to passive deorbiting missions

The ever-increasing proliferation of objects in Earth orbit, both operational satellites and space debris, poses a critical threat to the safe and sustainable use of space. An international effort is being undertaken to tackle this key issue, such as implementing end-of-life deorbiting manoeuvres or use of passive deorbiting devices, such as drag or solar sails. For objects already in orbit, these solutions could also be applied through so called de-orbiting kits deployed by a servicing spacecraft. On the downside, their relatively large cross-sectional area appreciably increases the risk of collision with other spacecraft or space debris. This work deals with the design of collision avoidance manoeuvres (CAMs) for end-of-life deorbiting missions using drag or solar sails, considering the possibility of manoeuvring either the de-orbiting satellite or the incoming object. By leveraging proximal motion equations, the optimal direction of the deviating actions in the impulsive and continuous-thrust cases is obtained, either by maximising the total deviation projected on the b-plane of the nominal conjunction or by minimising the collision probability at the conjunction. A set of representative cases is proposed by using ESA's MASTER tool to estimate the relative velocity of a possible conjunction at any given point of the deorbiting trajectory. Furthermore, the evolution of the covariance matrix with the time to impact is also considered, to check whether the growth of the uncertainties introduces a practical limit to the lead-time for the CAM.

Giovanni F. Gronchi (University of Pisa, Italy)

Playing with polynomials for the computation of orbits

We review a recent method for the computation of preliminary orbit of asteroids that uses two short arcs of optical observations. The method is based on the conservation laws of the Kepler problem. Playing with these relations we show that we are led to a polynomial equation of degree 9 for the topocentric distance of the asteroid, and that this degree is optimal in a sense that will be specified.

Rüdiger Jehn (ESA/ESOC, Germany)

Andrea Milani and the Gretchen Question

Whenever a spacecraft travels to an interplanetary target radio science is one of the major science objectives. Even MORE so with BepiColombo, when in Dec 2025 the European spacecraft will reach Mercury, which due to its proximity to