ORBITAL DYNAMICS AROUND ASTEROIDS.

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Abstract:

Orbital dynamics around asteroids have two major differences from those around major bodies---the asteroid's graviy is usually highly irregular, and the perturbation strength from solar radiation pressure is strong due to the asteroid's weak gravity. Nevertheless, there are practically stable orbits around asteroids even as small as the (469219) Kamoʻoalewa. In this talk, two types of orbits will be introduced, including the hovering orbits above the primary and the well-known frozen orbits.

Usually, there are large uncertainties of the force environment around asteroids. As a result, orbits around asteroids should be not only robust to errors in the state vector but also robust to errors in the force environment. There are different ways characterizing the robustness of orbits to these uncertainties. In this talk, the differential algebra combined with automatic splitting technique will be introduced and the small asteroid (469219) Kamoʻoalewa will be taken as an example.

Binary asteroids are targets of the ongoing DART mission and LUCY mission and the planning Hera mission and JANUS mission. Compared with solitary asteroid, orbital dynamics around binary asteroids are more complex because an extra perturbation from the satellite asteroid's gravity exists. Again, three types of practical orbits will be introduced in this talk, including the hovering orbit above the primary, the forced orbits around the libration points, and the orbits in resonance with the satellite asteroid.

Speaker: Xiyun Hou is currently a full time professor at School of Astronomy and Space Science, Nanjing University, China. His research interests are related with both celestial mechanics and astrodynamics, including libration point, periodic orbit and resonance, orbit design and station keeping, orbit determination and navigation, and planetary defense.