Plan Overview

A Data Management Plan created using DMPTool

DMP ID: https://doi.org/10.48321/D1831V

Title: A Relevância dos Pequenos Corpos em Dinâmica Orbital

Creator: Othon Winter - **ORCID:** 0000-0002-4901-3289

Affiliation: São Paulo State University (unesp.br)

Principal Investigator: Othon Cabo Winter, Silvia Maria Giuliatti Winter, Rafael Sfair de Oliveira, Rodolpho Vilhena de Moraes, Antonio Fernando Bertachini de Almeida Prado

Funder: São Paulo Research Foundation (fapesp.br)

Grant: 2016/24561-0

Template: Digital Curation Centre (português)

Project abstract:

In orbital dynamics, minor bodies are those that have size (and mass) much smaller than at least one of the other bodies (called primaries) of the system that belong to. One case very common in astronautics is the case of a spacecraft traveling within the Sun-Earth-Moon system. This kind of characteristic makes the dynamics of the system to present some peculiarities. One of them is the fact that the minor body, in general, does not significantly affect the orbital evolution of the primaries. However, in the case of having an expressive amount of minor bodies interacting with a primary body, an accumulative effect of the angular momentum exchange occurs, leading the primary body to significant orbital changes (orbital migrations). In the case of gravitational interactions between minor bodies, there can happen a variety of different outcomes, depending on physical and dynamical parameters of these bodies. Among the possibilities of outcomes is the collision between the bodies, which can result in fragmentation and/or accretion of the bodies involved. Other possibility is the scattering of these bodies, resulting in expressive orbital changes for both of them. In orbital dynamics there are many fields of study based on collective of minor bodies. This apply to satellite constellations, formation flight, clouds of space debris, families of irregular satellites, proto-planetary discs and planetary rings, for example. In this project will be developed studies that tackle from the question of fundamentals, as the phenomenon of collision and the development of gravitational potential of minor bodies (which, in general, are highly irregular), up to the most varied and relevant applications in astronautics (orbital evolution of satellites and spacecrafts, orbital maneuvers, evolution of space debris clouds, space missions to explore asteroids, etc) and planetary dynamics (origin and formation of planetary systems, of families of irregular satellites, of groups of asteroids, orbital evolution of planetary rings systems, etc). The project is structured in four interconnected parts classified as: A)

Gravitational Potential, Periodic Orbits and Stable Regions; B) Collision, Fragmentation and Accretion; C) Orbital Maneuvers; D) Clouds, Rings and Discs. Each one of the four parts of the project will be developed by at least three of the five main researchers, together with other collaborators (researchers and students). All parts will be developed simultaneously, existing direct connections among them. In special, the studies to be developed in parts (A) Gravitational Potential, Periodic Orbits and Stable Regions, and B) Collision, Fragmentation and Accretion will be applied in the other two parts and will receive inputs from them along their developments. For example, collision is a basic question in the generation and evolution of space debris, as well as, in the studies of planetary formation and formation of families of irregular planetary satellites. In the case of the gravitational potential of irregular bodies, the development of these potentials will be fundamental in the studies of the orbital evolution and maneuvers of spacecraft exploring these bodies, as well as, in the studies of natural satellites and particles that orbit around them. Most of the problems to be studied will be preceded by or followed by a dynamical systems approach, analyzing the existence of equilibrium points, periodic orbits and stable regions. In particular, the occurrence of the resonance phenomena will be explored in many of the sub-projects.

Start date: 09-01-2017

End date: 08-31-2022

Last modified: 01-17-2024

A Relevância dos Pequenos Corpos em Dinâmica Orbital

Os dados a serem gerados no projeto envolvem resultados de integrações numéricas, de simulações de SPH (Smooth Particles Hydrodynamics), e de mapeamentos de características físicas nas superfícies de corpos irregulares.

Os dados serão criados a partir de estudos computacionais gerando como resultado arquivos com os dados a serem armazenados.

Serão acompanhados de uma descrição do conteúdo de cada arquivo, bem como, dos parâmetros adotados para gerar os respectivos arquivos, além dos artigos publicados que se basearam nestes dados.

De um modo geral, os dados deste projeto não envolvem questões éticas. Casos em que isso se aplique serão analisados separadamente.

De um modo geral, os dados deste projeto não envolvem questões de direitos autorais e direitos de propriedade intelectual. Casos em que isso se aplique serão analisados separadamente.

Durante a pesquisa, os dados serão armazenados em drives de armazenamento do grupo de pesquisa e também na nuvem.

Após as trabalhos que utilizaram os dados serem publicados em periódicos, os dados serão armazenados no Repositório da UNESP e poderão ser acessados publicamente.

Isso variará de trabalho para trabalho. Porém, as simulações computacionais que consumirem tempo de processamento longos (da ordem de meses), certamente deverão ser preservados.

A princípio, o Repositório da UNESP preservará a longo prazo o conjunto de dados. Todavia, com o passar do tempo, parte dos dados que podem ser reproduzidos com alguma facilidade, serão reavaliados no que tange a relevância de mantê-los armazenados.

Os dados serão de acesso público a partir do momento que forem armazenados no Repositório da UNESP.

A princípio, não existem restrições de compartilhamento do dados.

Os pesquisadores principais do projeto.

Já possuímos os recursos necessários, não sendo necessários outros recursos.
