

Postdoctoral position at the
« Institut des Mécaniques Célestes et de Calcul des Ephémérides »
on the Moon tides as seen by lunar laser ranging observations

Profile: Researcher contract

General Information

Laboratory: IMCCE- Observatoire de Paris, Paris, France

Contract: CNRS researcher contract

Duration: 18 months

Starting from: 01-Jan-2021

Salary: depending the level of experience of the candidate

Academic diploma: Ph.D Degree

Skills : PhD in dynamics or geophysics or numerical modeling

Mission

One of the key objectives of the Lunar Laser Ranging (LLR) is to constrain the Lunar interior structure. The LLR observations allow precise tracking of the time-varying lunar positions and orientations and the knowledge of the rotational motion provide insight about the lunar interior. However, by comparing with space mission data such as GRAIL and LOLA, it appears some discrepancies between the determination of the Love numbers. As a consequence, the tidal deformation and dissipation modeling in lunar ephemerides and the understanding on the data analysis need to be improved. We expect to obtain robust and consistent determination of the Love numbers that is a key for constraining the inner structure and to determine the viscoelastic behavior of the Moon.

Activities

The first task of the postdoc will be to perform simulations in order to determine the influence of the spatial distribution of the retro-reflectors on the Moon's Love numbers through INPOP ephemeris and Lunar Laser Ranging data (LLR). This work will allow the candidate to familiarize with INPOP adjustment method and LLR data. The second task will be to improve the moon rotation model included in INPOP and the third task will be to fit these new models to LLR data.

These three tasks will be carried out successively during the 18 months of the postdoc, starting with a simple tidal model and then making it more and more complex (elastic, viscoelastic, frequency Love number, asymmetric). A first tidal model is already included in INPOP which will serve as a reference test case. The rheological parameters and laws, elastic and viscoelastic Love numbers, will be provided by the other project partners and the candidate will focus on the modeling and integration of these models into the dynamical ephemerides. The step of adjusting to the data will consist of using existing programs already developed. The candidate will benefit from the experience of the Géoazur team (A. Fienga) which regularly performs the adjustment of dynamic models to LLR data.

Skillness

The position is open to a researcher who has recently defended his thesis and has less than 7 years after the doctorate. For these tasks, a qualified researcher in dynamics with experience in dynamical code development is required. A good knowledge of geophysical methods in the solar system and data analysis is also necessary for success in 18 months.

Context

This position is open as part of a bi-lateral Franco-German project of 3 years, Lunar tidal Deformation from Earth-based and orbital Laser Ranging (LDLR), funded by the French ANR and the German agency DGF as part of an international collaboration bringing together specialists in altimetry (DLR / TU), lunar libration (IMCCE) and planetary deformation (Géoazur).

The candidate would work closely with Nicolas Rambaux at the IMCCE, Observatory of Paris, and Agnes Fienga at the Observatoire de la Côte d'Azur, and the team of the ANR – DGF.

Interested candidates should respond by email (Nicolas.Rambaux@obspm.fr) with a letter of motivation describing how their expertise would fit this research theme, a CV and contact for two references.

Review of applications will begin August 20 and will continue until the positions are filled.