The 11th Annual Exhibition of Undergraduate Research and Creative Activities - EXPO 2024

GUEST SPEAKER

Pavel Travnicek, Ph.D.

Research Scientist - Space Sciences Laboratory

University of California, Berkeley

April 19, 2024 - 9:15 to 10:00 a.m.

Live Oak Ballroom - Setzer Center

SHORT BIOGRAPHY:

Pavel Travnicek is Research Scientist at Space Sciences Laboratory University of California, Berkeley since 2010. Travnicek received his Ph.D. from the Department of Mathematics at the Faculty of the Nuclear Science and Physical Engineering of the Czech Technical University in 1997. Since 1994 Travnicek worked as a scientist in Czech Academy of Sciences and visited sevaral laboratories in U.S.A. (SwRI, UNR, UCLA, JPL), U.K. (UCL), France (CNRS). In 2008 Travnicek joined in Institute of Geophysics and Planetary Physics, UCLA, where he worked since 2002 as visiting researcher. Travnicek works extensively with hybrid codes applied to high resolution studies of instabilities in space plasmas and global simulations of the interaction between collissionless plasma flow and unmagnetized and weakly magnetized obstacles (bodies of our solar system). His global model of Mercury's magnetosphere has been used by magnetometer team for the interpretation of MESSENGER observations and his global model of Moon has been used for lunar wake simulations within the NASA DREAM project. Travnicek is Principal Investigator (PI) of the DSLP experiment at ESA's Proba 2 spacecraft, Co-Investigator of MPPE experiment on BepiColombo, Co-I on Solar Orbiter (RPW experiment), and Co-I on JUICE (RPWI experiment).

LECTURE: Global Numerical Modeling of Space Plasmas as a Supporting Tool of Space Missions

Global numerical models of the interaction of space plasmas with different bodies of our solar system play an important role in mission planning and in the interpretation of in-situ observations. Global three-dimensional (3-D) models allows us to put spacecraft observations (which are performed along a one-dimensional trajectory) into a full 3-D context and they do not suffer from constraints imposed on spacecraft observations. On the other hand, they are just models and do not produce real data. We have developed a global 3-D numerical model of Mercury's magnetosphere which has been used during MESSENGER mission and it is used now in BepiColombo. The model allows us to study processes in Mercury's dynamic magnetosphere, energization of charged particles, their transport and their precipitation on Mercury's surface. We have also developed global model of Moon's interaction with the solar wind which allowed us to study 3-D structure of the lunar wake. We used the same technology to develop such models of Jupiter's moons Io, Europa and Ganymede. For many years the development of the global models has been limited by the available computing resources. However, most of these challenges have been overcame in past two decades and global models represent a standard tool enhancing our understanding of in-situ observations.

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