Geophysical Research Abstracts
Vol. 17, EGU2015-6593, 2015
EGU General Assembly 2015

The MICROSTAR electrostatic accelerometer for the GRASP Mission

Bernard Foulon, Bruno Christophe, Francoise Liorzou, Phuong-Anh Huynh, and Eddy Perrot
ONERA, The French Lab, DMPH, Châtillon, France (bernard.foulon@onera.fr)

The Geodetic Reference Antenna in Space (GRASP) is a micro satellite mission concept dedicated to the enhancement of all the space geodetic techniques, and promising revolutionary improvements to the definition of the Terrestrial Reference Frame (TRF). GRASP collocates GPS, SLR, VLBI, and DORIS sensors on a dedicated spacecraft in order to establish precise and stable ties between the key geodetic techniques used to define and disseminate the TRF. GRASP also offers a space-based reference antenna for the present and future Global Navigation Satellite Systems (GNSS).
The integration of an ultra sensitive accelerometer at the Center of mass of the satellite can provide not only improvement of the Precise Orbit Determination (POD) by the accurate measurement of the non-gravitational force acting on the surface of the satellite but also by the possibility to calibrate with an accuracy better than 100 μm the change in the position of the Satellite Center of Mass as it is performed in the GRACE mission and to determine the precise motion of the antennas assuming some rigid structure between them and the accelerometer as it is done between the star sensor, the optical cube assembly of satellite laser ranging system and the accelerometer in the GRACE-Follow On mission.
The proposed accelerometer is miniaturized version of the electrostatic accelerometers developed for the Earth gravity missions CHAMP, GRACE, GOCE and GRACE-FO. He has 3 sensitive axes thanks to a cubic proof-mass and provides the 3 linear accelerations and the 3 angular accelerations about its 3 orthogonal axes. He is called MICROSTAR and its foreseen performance is a linear acceleration noise lower than 10-11 ms-2/Hz1/2 into a measurement bandwidth between 10-3 Hz and 0.1 Hz.