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## Spacecraft formation flying control subject to Lorentz force perturbations

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A spacecraft that generates an electrostatic charge on its surface in the Earth magnetic field will be subject to a perturbative Lorentz force in Low Earth orbit (LEO). The Lorentz force acting on an electrostatically charged spacecraft may provide a useful thrust for controlling a spacecraft's orbit. In this work, the Lorentz force will be developed as a function of the orbital elements. The orbital perturbations of a charged spacecraft due to Lorentz force in the Earth's magnetic field, which is modeled as a titled dipole is investigated using the Gauss variation of the Lagrange Planetary Equations. The dynamical models of the relative motion will develop what leads to approximate analytical solutions for the motion of a charged spacecraft, subject to Lorentz force. The innovative concepts of this work is replacing the usual control like propellent or thruster by electrostatic force. The model is derived when the chief spacecraft's reference orbit is either circular or elliptical and the deputy spacecraft is capable of established electrostatic charge. The expected results will focus on how to control and correct the in track position or/and plane orbit of the charged spacecraft using the Lorentz force. The trajectories of the both spacecraft (chief and deputy) will be estimated for short time intervals with different charge to mass ration (q/m) for different orbits in LEO.

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## Surface deformation in the Himalaya and adjoining piedmont zone of the Ganga plain, Uttarakhand, India: Determined by different radar interferometric technique

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The Himalaya and adjoining Ganga (also called Gangetic) plain are traversed by a number of neotectonically active longitudinal and transverse faults. However, the pattern and extent of present day slip rate along these faults is not known. We here-in present the results of our investigations directed in this direction. Surface deformations induced by active faults during a period of three years from August 2008 to August 2010 in the southern part of Uttarakhand state of India have been monitored. Multi-date ENVISAT radar images of the area have been analyzed by applying the lastest Interferometric Synthetic Aperture Radar (InSAR) remote sensing techniques of Persistent Scatterer Interferometry (PSI) and Atmospheric Correction InSAR (ACI) using the MODIS data. Both the PSI and ACI techniques were found capable of extracting valuable surface information despite the natural challenges of vegetal cover and mountain terrain. The study revealed some conspicuous surface deformation patterns, which are related to active movements along some of the major faults/thrusts of the area, e.g., the Himalayan Frontal Thrust (HFT) and the transverse Garampano-Kathgodam Fault (G-KF). The G-KF acts as a segment boundary fault, dividing the study area into two distinct part with relative subsidence on the east and uplift in the west. Based on our presumption about the G-KF, a generalised tectonic model of the study area has been created. The study has provided a better understanding of the active tectonics of the area.

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