عنوان مقاله:

Natural Magneto-velocity Coordinate System for Satellite Attitude Stabilization: The Concept and Kinematic Analysis

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خلاصه مقاله:

An artificial Earth satellite with an electric charge and an intrinsic magnetic moment is considered. Due to the geomagnetic field, the satellite experiences the influence of the Lorentz and magnetic torques. To set the angular position of the satellite, we introduce natural coordinate system associated with the directions of geomagnetic induction vector and Lorentz force vector which is orthogonal both to the geomagnetic induction and relative velocity of the satellite. It is shown that such a natural magneto-velocity coordinate system is convenient for attitude stabilization of a satellite operating in the mode of scanning the Earth's surface. The properties of the trajectory of the satellite axis on the Earth's surface are analysed. The rotation tensor connecting the natural magneto-velocity and the orbital coordinate systems is obtained. The angular velocity of the natural magneto-velocity trihedron is found. Kinematic differential equations for the unit vectors of the natural magneto-velocity coordinate system are derived.

کلمات کلیدی:

artificial Earth satellite, geomagnetic field, electric charge, intrinsic magnetic moment, attitude control

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