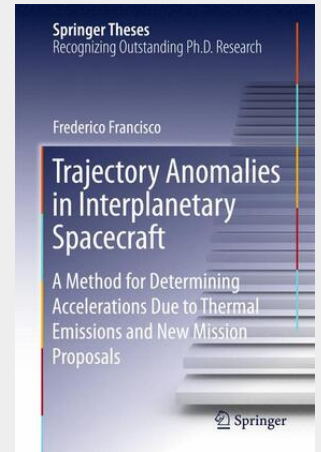


Francisco

Trajectory Anomalies in Interplanetary Spacecraft

A Method for Determining Accelerations Due to Thermal Emissions and New Mission Proposals

This thesis presents fundamental work that explains two mysteries concerning the trajectory of interplanetary spacecraft. For the first problem, the so-called Pioneer anomaly, a wholly new and innovative method was developed for computing all contributions to the acceleration due to onboard thermal sources. Through a careful analysis of all parts of the spacecraft Pioneer 10 and 11, the application of this methodology has yielded the observed anomalous acceleration. This marks a major achievement, given that this problem remained unsolved for more than a decade. For the second anomaly, the flyby anomaly, a tiny glitch in the velocity of spacecraft that perform gravity assisting maneuvers on Earth, no definitive answer is put forward; however a quite promising strategy for examining the problem is provided and a new mission is proposed. The proposal largely consists in using the Galileo Navigational Satellite System to track approaching spacecraft, and in considering a small test body that approaches Earth from a highly elliptic trajectory.



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