A simulation for Phobos gravity field recovery from a quasi-satellite orbit

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Owing to the gravitational acceleration of Phobos is far less than Mars, the satellite cannot orbit Phobos. Currently the information of Phobos gravity field are mainly retrieved from several Mars Express flybys. The Mars missions in plan, like Martian moons exploration mission (MMX) from JAXA and DePhine proposed by ESA, will apply a quasi-satellite orbit on Phobos, which is supposed to make a great contribution to gravity field recovery. In this work, a quasi-satellite orbit is designed for Phobos gravity field recovery. This orbit has nearly a comprehensive global mapping on Phobos surface and do not need frequent track maneuvering. The simulation shows that a ten-degree gravity field model could be recovered and the model accuracy is assessed by power spectrum analysis. With such a quasi-satellite orbit, the Phobos gravity field will gain significant improvement.

Keywords: Phobos, Quasi-satellite orbit, Gravity field recovery

