

Mars Exploration (5)

Mars Exploration (1)

Author: Dr. Yan Jianguo  
Wuhan University, China, jgyan\_511@163.com

## THE CONTRIBUTION OF SBI IN MARTIAN GRAVITY FIELD RECOVERY

### Abstract

The same-beam interferometry (SBI) is an effective technique in relative positioning, and it has been successfully applied in SELENE and Chang'E-3. It can be used to improve the positioning accuracy of various spacecraft, as well as the accuracy of lunar gravity field. As the Chinese first Mars exploration mission will have a spacecraft, a lander and a rover at same time, it is possible to do SBI measurement between the spacecraft and lander. In this work we will present the simulation work about the contribution of SBI in Martian gravity field solution. We consider two cases, one is the SBI between a polar orbiter (close to MRO) and an elliptic orbiter (close to the orbiter of Chinese Mars mission); the other case is the SBI between an elliptic orbit and a lander (close to Chinese Mars mission). In both cases a polar orbiter is considered to be a reference gravity field solution. In our simulation we consider the length of one month. From the simulation results we can find that as to the first case the SBI will contribute to the low degree coefficients (from degree 2 to 10), while for the second case the contribution of the SBI is mainly on the middle degree coefficients (from degree 10 to 30), and for the both cases the gravity field model using SBI will improve the precise orbit determination accuracy of the elliptic orbiter. This research will provide reference to the Chinese first Mars exploration mission.