

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)  
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## ORBIT DETERMINATION OF CHANG'E-1 USING LASER CROSSOVER DATA

**Abstract**

Chang'E-1 (CE-1) deliberately crashed into the moon's surface, on Mach 3, 2009. Before the crash, CE-1 has worked for approximately 494 days. During the phase orbiting the moon, CE-1 laser altimeter (LAM) have worked for almost ten months around the moon, and more than 9 million range measurements were obtained. The LAM has covered the whole moon's surface, and accuracy of the LAM is 5m. LAM can be treated as separate tracking data to check the orbital accuracy. In this manuscript, we extracted the laser crossover data to determine CE-1's orbit joint with USB and VLBI tracking data. Because the orbit of CE-1 is polar and quasi circular, we can only get a few crossover data distributing in the polar region. In addition, angular momentum desaturation occurred almost every day, the improvement of the orbital accuracy with laser crossover is not significant, especially during the phase that both USB and VLBI tracking CE-1. According to the residuals of laser crossover, the orbit accuracy of CE-1 is better than 20m in radial direction.