

SELENE-2/逆VLBI電波源 (iVLBI) のミッション概要と検討状況について

Overview and progress of inverse VLBI / SELENE-2

菊池 冬彦¹, 松本 晃治^{1*}, 岩田 隆浩², iVLBI検討チーム¹

Fuyuhiko Kikuchi¹, Koji Matsumoto^{1*}, Takahiro Iwata², iVLBI team¹

¹国立天文台RISE月探査プロジェクト, ²宇宙航空研究開発機構 宇宙科学研究本部

¹RISE Project, NAOJ, ²ISAS, JAXA

We plan to apply new VLBI technique for next Japanese lunar mission. The iVLBI instrument, which consists of inverse VLBI and same-beam VLBI units, is proposed for lunar landing mission SELENE-2. The purpose of the instrument is to improve the accuracy of lower-degree coefficients of the lunar gravity field.

In the case of inverse VLBI, artificial radio source is loaded on one orbiter and one lunar landing unit (a small survival module on the lunar surface). These transmit three S-band carrier wave signals and the difference of the distance between radio sources and ground VLBI station is measured. This differential range measurement is sensitive to the motion of the orbiter relative to lunar landing unit. The 2-way ranging between the orbiter and the lunar landing unit is also carried out by using three S-band signals. The range is accurately determined from the phases of the radio signals.

We also apply the heritage of VRAD mission of Kaguya, same-beam VLBI technique. The radio source loaded on the orbiter and the lunar landing unit transmits three or four S-band signal and one X-band signal to the earth. These signals are received at a pair of VLBI stations. A doubly differenced range between two lunar radio sources and VLBI stations are measured within the error of less than 1 mm. This measurement will also contribute to determine the position of the orbiter and the lunar landing unit.

In the presentation, the principle of inverse VLBI, detail of the instrument for SELENE-2, and recent status are shown.