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Ground-base verification of four-way Doppler measurement for the SELENE mission

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In Japan's lunar mission called SELENE, detailed measurements of the lunar gravity field will be carried out by using two methods. The first is the differential VLBI measurement with two sub-satellites, and the second is the four-way Doppler measurement by using a sub-satellite which relays radio waves from the main lunar orbiter. Especially the lunar far-side gravity field will be directly measured for the first time by using the relay satellite, which will give us new information about the inner structure of the Moon. The instruments are now under development, and various tests of Usuda Deep Space Center (UDSC) and of instruments onboard SELENE have been conducted in order to confirm the expected function of the four-way Doppler measurement. Through these tests, it has been confirmed that our four-way measurement system has potential to determine the position and line-of-sight velocity of the sub-satellite within the error of 1m and 0.2mm/s~0.3mm/s respectively. The test of the proto-flight-model(PFM) is also scheduled at UDSC in Mar. 2003. In our paper, the results of these ground-base tests will be reported.