

SPACE EXPLORATION SYMPOSIUM (A3)
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LUNAR EXPLORATION MISSION BY REUSING LEO OBSERVATION SATELLITE

Abstract

The satellite lifetime is almost caused by exhaustion of fuel for the altitude and position control more than the reason of communicates interruption or electronic components breakdown. In relation, the U.S. DARPA's Orbital Express mission in MAY 2007 demonstrated the possibility of autonomous refueling on orbit for the expansion of satellite lifetime. The fully autonomous rendezvous and docking between two satellites was successfully performed in this experiment.

This paper considers the lunar exploration mission design by reusing Korea Multi-purpose Satellite (KOMPSAT-2) that will be finished its lifetime in 2011. When reuse the LEO observation satellite for the lunar exploration, we can get more economical and effective results. KOMPSAT-2 is located in the orbit at 685km altitude. It has high resolution Multi-Spectral Camera (1m panchromatic (Pan) and 4m multiband (XS) images) for the accurate observations. If the KOMPSAT-2 send to the moon orbit at 50km altitude we can get 0,07m panchromatic and 0,29m multiband super high resolution images never get yet with other lunar explorer.

To realize this, launch the additional module installed main engine for the flight to the moon including lunar exploration devices. And then it performs automatic rendezvous and docking with KOMPSAT-2. After that become one lunar explorer it is sent to higher orbit for the entrance to the moon orbit. When the explorer arrives in the mission orbit, it is started mission that include highly accurate 3D cartography, gravity and magnetic field measurement, mineral resource investigation.

The thrust to reach the moon and flight control can be gotten from main engine and thruster of additional module that would be launched from the earth. So the refueling system is no need. Communication system is also no need to change its communication band and type. After docking, the additional module receives a signal from KOMPSAT-2 and amplifies and retransmits by a transponder installed in. It makes be possible to communicate between an earth station and KOMPSAT-2. The automatic rendezvous and docking technology on orbit is already demonstrated by US, Japan. But in case of docking with common satellite that has no special docking system is not tried yet. In this study, propose the method using the kick motor nozzle and the launcher interface ring.

The lunar exploration will be enabled more economically and effectively from the above technologies. In this regard, the first lunar exploration mission by reusing LEO observation satellite is expected to produce new and important results.