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AUTONOMOUS INTEGRATED ATTITUDE AND ORBIT CONTROL OF ALL-ELECTRIC
SATELLITE WITH GPS RECEIVER

Abstract

Normally, in all-electric satellite, orbit control and angular momentum management are performed simultaneously with fewer electric propulsions due to mounting limitation. And, fewer thrust requires more frequent orbit control compared to chemical thruster. In addition, regarding HK operation in GEO, normally, orbit determination by ranging and uploading orbit control plan are required. In case of all-electric satellite, the reduction of these operations should be taken into account.

Recently, GPS receiver in GEO comes into play and is expected to be utilized in GEO. Utilizing GPS receiver in GEO reduces the ground support described above. In addition, orbit control planning and execution are automatically performed with orbit determination from GPS receiver and it makes possible that highly autonomous satellite system is achieved.

ETS-9, designed by Melco as prime contractor, is an all-electric communication satellite under development in Japan for the first time. ETS-9 has the capability of highly autonomous control system described above with electric thrusters on the top of two booms and GPS receiver. In this paper, integrated attitude and orbit control with GPS receiver under development in ETS-9 is presented.