Progress of Software Development of Multi-Utility Spacecraft Charging Analysis Tool (MUSCAT)

Tateo Goka[1]; Takanobu Muranaka[2]; Shinji Hatta[2]; Jeongho Kim[2]; Satoshi Hosoda[2]; Mengu Cho[2]; Kiyokazu Koga[3]; Hiroko, O Ueda[3]; Goka Tateo MUSCAT Development Group[4]

[1] ISTA/JAXA; [2] KIT; [3] JAXA; [4] -

Since a failure of polar orbiting satellites caused by charging has become a serious issue, Japanese Aerospace Exploration Agency has decided to develop a computational tool that can calculate charging status of not only for a polar orbiting satellite but also for a GEO or a low inclination LEO satellite jointly with Kyushu Institute of Technology. The aim of the tool is to give satellite designers chances to identify the charging hazard in the satellite design phase with user-friendly interface. The software named, Multi-Utility Spacecraft Charging Analysis Tool (MUSCAT), has been developed since November, 2004, and will be released in March, 2007.

The simulation code is a combination of Particle-in-Cell method and Particle Tracking method. The orbit, attitude, configuration and materials of the satellite as well as the condition of space environments are inputs for the analysis. The output of the code will be verified in comparison to the results of other analysis codes and of experiments in some chambers. It also be expected the feedback from simultaneous observation data of satellite potential and space environments on various orbits.
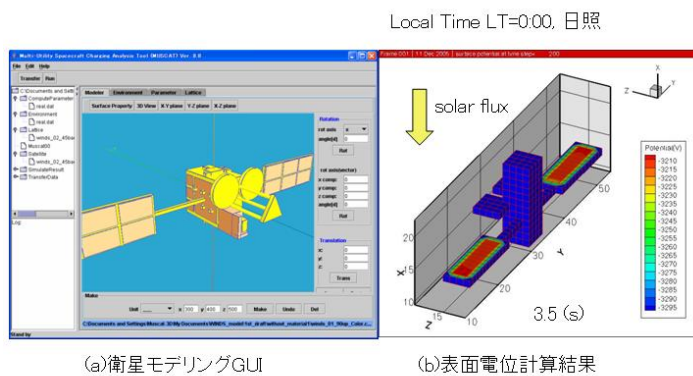

(a)衛星モデリングGUI　　　(b)表面電位計算結果

Fig.1 MUSCATによる衛星帯電解析例