Propagation characteristics of EM noises from a solar sensor onboard satellitesand their shielding method

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It is very important for EMC requirements of spacecrafts to identify the propagation characteristics of electromagnetic noises emitted from several instruments onboard themselves. In this study, we studied the propagation characteristics of EM noises emitted from the solar sensor onboard NOZOMI spacecraft (, which was the first Japanese spacecraft designed for observing EM environments around the Mars,) with performing FDTD simulations, and estimated the most effective shape of conductive hood for shielding antennas to observe plasma waves from EM noises.

At first, we performed 2D FDTD simulations and demonstrated EMC experiments of solar sensor carried out before NOZOMI spacecraft had been launched. The simulation results indicated that,the noise intensity at the position of the antenna was sufficiently attenuated,when the solar sensor was covered with conductive food.Next, we calculated the distribution of EM noises around the NOZOMI spacecraft with 2D FDTD simulations,and estimated the most effective shape of conductive hood for shielding antennas from EM noises. We performed two series of 2D FDTD simulations with changing different parameters, one is changing an angle of hood, the other is changing a length of hood, and compared about noise intensity at the position of the antennas.Consequently, we know that the conductive hood for solar sensor onboard NOZOMI spacecraft had sufficient shielding effect.

Since these simulations are assumed EM noises propagate in free space,we cannot confirm shielding effect of the conductive hood for solar sensor onboard NOZOMI spacecraft in space plasma. We are going to develop FDTD simulation code which can treat wave propagations in space plasma, and to confirm shielding effect in space plasma.