

Computer Experiments on Effects onto Magnetospheric Plasma by Heavy Ions injected from Electric Propulsion Engines used for SPS.

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In planning of Solar Power Satellites(SPS), electric propulsion engines are a candidate for a mass transportation of parts,because electric propulsion engines need less propellant than chemical propulsion engine.

Electric propulsion engines uses heavy ions as propellant. The mass of the injected heavy ion exceeds that of the local natural magnetospheric plasma.Therefore,we have to investigate effects onto space environments by injection of large quantity of heavy ions from electric propulsion engines.

Our research group developed two-dimensional hybrid code to study the effect of heavy ion injection[2003].Although this approach can give us qualitative results, we need to investigate this problem quantitatively. We extend two-dimensional hybrid code to three-dimensional hybrid code for quantitative studies. Before conducting realistic modeling of electric propulsion engines, we studied the initial responce of the system when localized dense heavy ion cloud is injected.

We assume in the computer simulation that uniform background plasma is in three dimensional space,ambient magnetic field is taken in the y direction and localized argon ion cloud is injected toward the x direction. In this simulation, We observed a shock wave by injecting argon cloud and studied relation between speed of argon cloud and speed of shock front.