GEC-CCP Modelling Using Two-Dimensional Fluid Simulation Base on Stabilized Finite Element Method

Hyonu Chang [1]

[1]*NFRI, Korea, Republic of*

Recently, two-dimensional hydrodynamicplasma simulation based on finite element method is developed. Electrostaticfield is obtained by solving Poisson\'s equation and utilized to get thetransport coefficients in fluid equations for charged species. Continuityequations for charged species such as electron, singly charged ion, andelectron energy are considered in the simulation. The ion termperature is fixed to room temperature and the transport equation forthe metastable species is also included. As the simulation code is stabilizedusing the Characteristic-Galerkin method, it is possible to get to theconvection-diffusion problem including sheath area which has high electricfield. Mesh generation, linear solver, parallelization and matrix constructionwere provided in reference to the open library LIBMESH. GEC-CCP devices weremodelled and compared with the results from other references to test thevalidity of this simulation code. The GEC-CCP device is suitable for testingsimulation as it contain conductors and dielectric materials, and has a morecomplex geometry comparing with plat panel discharges. At the pressure of100 mTorr, the rf voltage of 100 V and the frequency of 13.56 MHz is applied in pure argon background gas plasma, which is the most common condition inreferences. Explicit time step is applied and released repeatedly until steadystate was reached.