

# Calculation on the Performance of Top-Hat Plasma Particle Analyzer Using the Boundary-Fitted Coordinate System

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In this study, the boundary-fitted coordinate system is employed to carry out a numerical simulation of Top-Hat plasma particle analyzer. This method has an advantage to calculate the small or oblique structures which cannot be treated by the calculation using the traditional orthogonal coordinate system. We conduct the calculation of electric field and particle trajectories, and evaluated the performance of the Top-Hat analyzer including highly structured serrations. Then we compare the results obtained using different grid distributions to find the the best grid distribution for the calculation of plasma particle analyzer.

Further the equivalent set of flat toroidal plates which are replacable to the toroidal plates with serrations is obtained by numerical simulation. The obtained gap between equivalent plates is consistent with the empirical result, but the boundaries for particles are found to be narrower and should be set to the surfaces which contain tips of serrations of toroidal plates. Our results suggest that the boundary-fitted coordinate system is applicable and quite effective to perform the numerical simulation of plasma paritlce analyzers.