Including Boundary Effects of Complex Structures On High Intensity Beams[1] ANTHONY GEE, BELA ERDELYI, Northern Illinois University — With the spread of high intensity particle beam applications, future system designs require sophisticated beam dynamics simulation. Common issues in beam control are aberrations due to space charge (self-fields) and the beam pipe wall (boundary effects). One approach views space charge as an N-body problem. Direct summation scales as $O(N^2)$. We implemented a fast $O(N)$ summation algorithm called the Fast Multipole Method in previous work. This was later combined with an adaptive time integrator and used to model the particle dynamics, assuming open boundary conditions. In practice, the beam pipe contributes significantly to the high intensity dynamics. This contribution is geometry dependent and becomes complicated for realistic structures. I will present my current progress in modeling the boundary effects for complex structures.

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