

Progress Report

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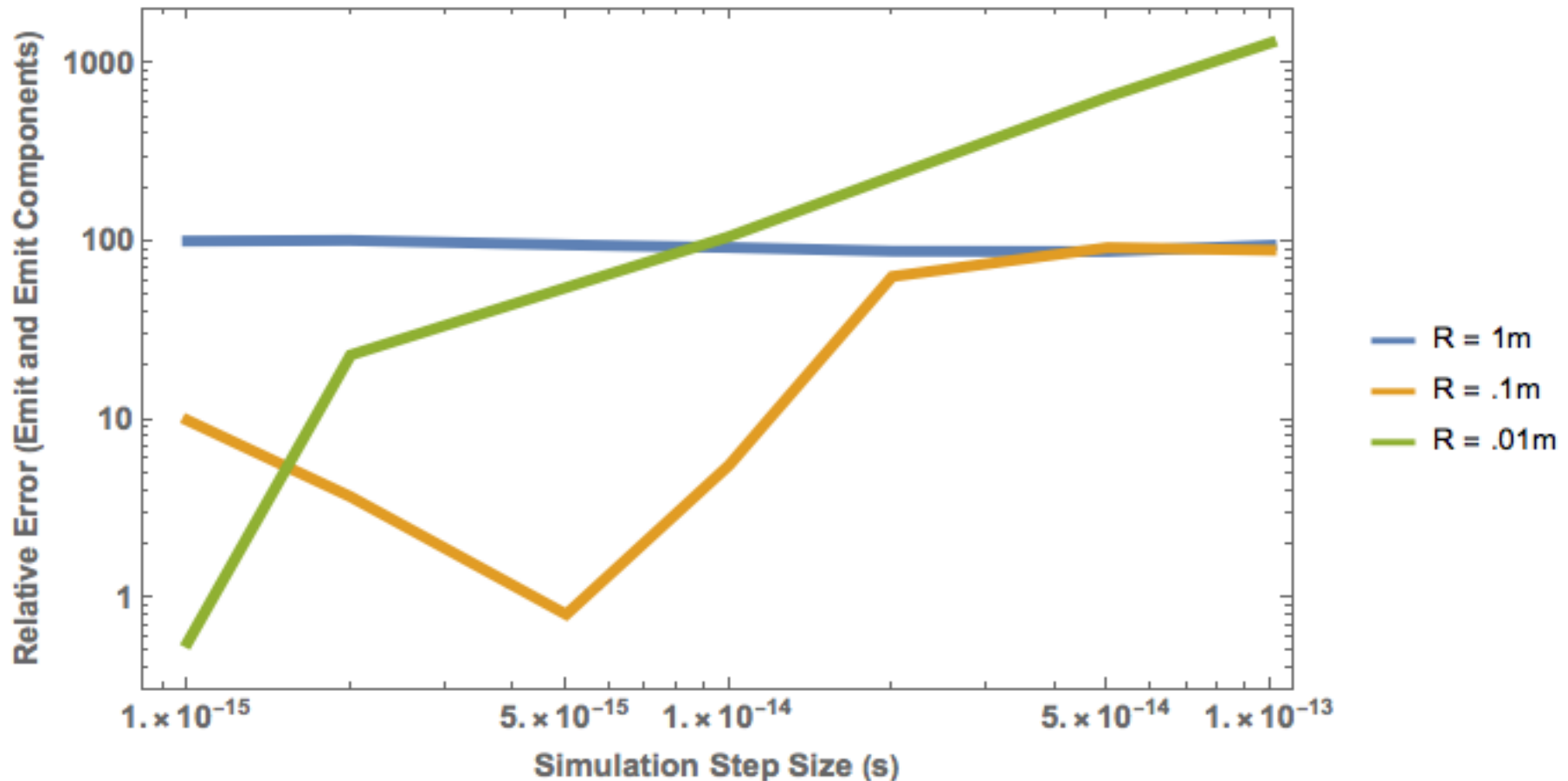
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Geometric Aberration + Convergence Study

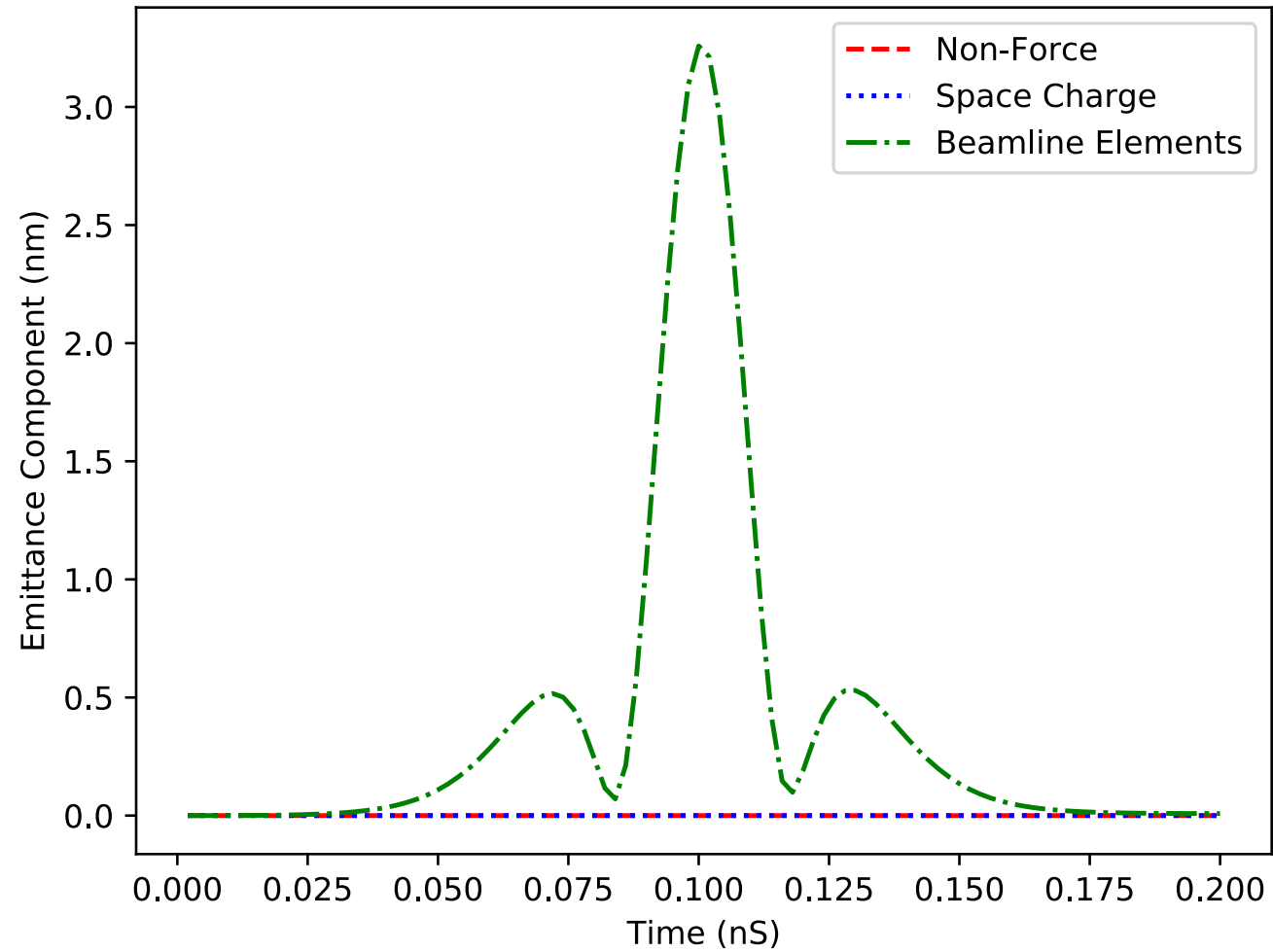
- Simple Test Case: Use emittance component tool to identify geometric aberration emittance growth from a current loop in simulation
- Found that emittance component wasn't converging to emittance from GPT
- Test convergence of emittance component algorithm to emittance as well as theoretical geometric emittance growth

Radius Convergence Variation

- More questions than answers came when changing the radius of the solenoid

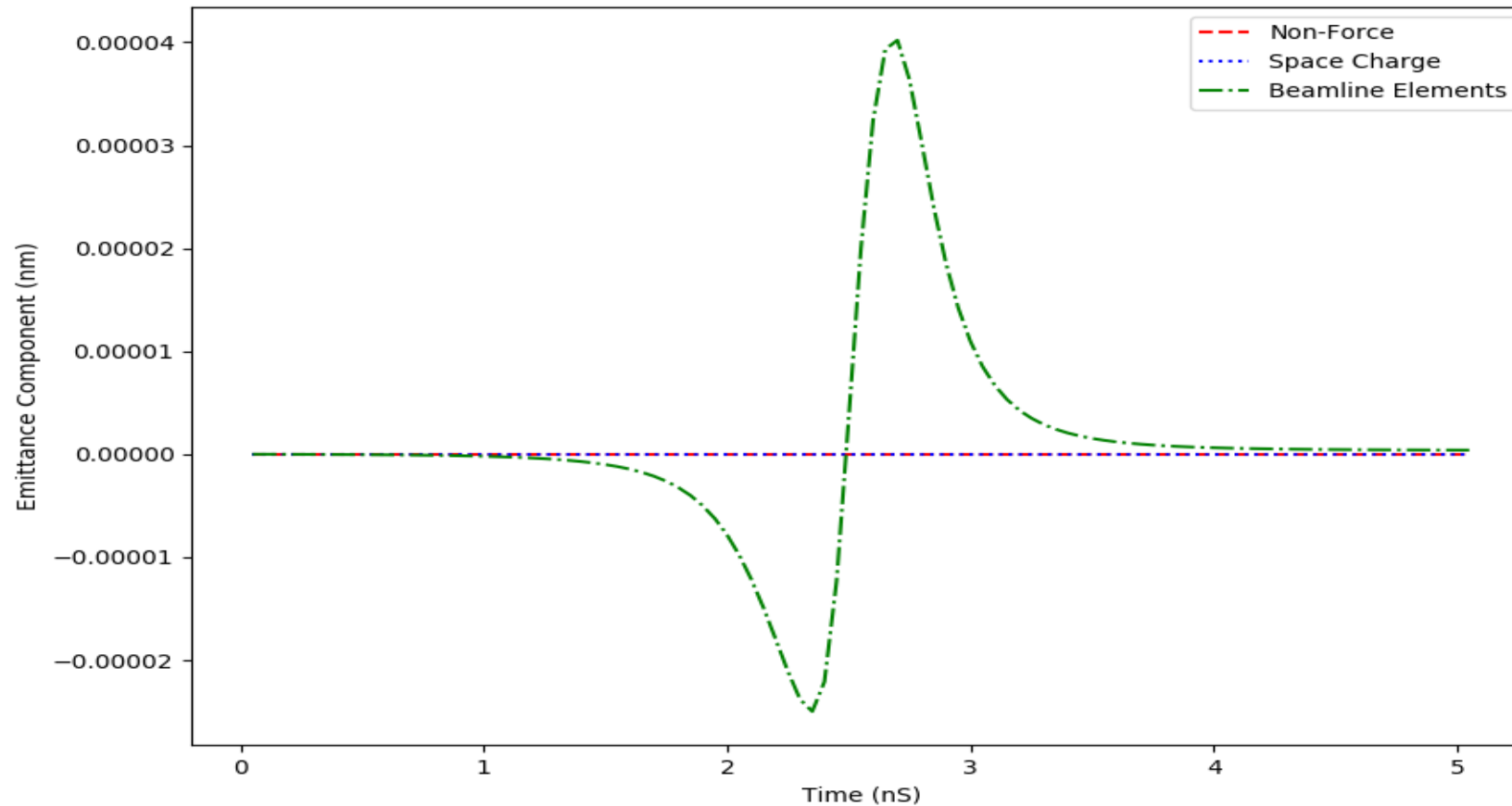


2e-15 Test Case



1e-14 test case R = .1m

- Clearly something was changed that I'm missing



```
# Define the beam parameters
gamma = 10;
radius = 1e-3;
length = 1e-6;
number_of_particles = 1000;
total_charge = 0;
initial_emittance = 1E-9;

#Radius and Current of Current Loop
R=.1;
I=1000;
#Divisor used to scale timestep and lattice
DVR = 10;

# Start the beam
setparticles("beam", number_of_particles, me, qe, total_charge);
setrxydist("beam", "u", radius/2, radius);
setphidist("beam", "u", 0, 2*pi);
setGdist("beam", "u", gamma, 0);
setzdists("beam", "g", 0, length, 3, 3) ;

# Set its initial emittance to 1nm
setGBxdist("beam", "g", 0.0, 1e-3, 3.0, 3.0);
setGBxemittance("beam", initial_emittance);
setGBydist("beam", "g", 0.0, 1e-3, 3.0, 3.0);
setGByemittance("beam", initial_emittance);

#Current loop halfway through the beamline with radius R and Current I
solenoid("wcs", "z", 1.5/DVR, R, I);

#Space Charge settings, Charge set to 0, spacecharge will be ignored, but left in for force caching
Alpha = .1;
Fn = 0.5;
verror = 0.05;
Nstd = 1;
spacecharge3Dmesh_caching("Cathode", "MeshNfac", Alpha, "MeshAdapt", Fn, "SolverAcc", verror, "MeshBoxSize", Nstd);

# Compute the emittance components
emittance_component("4d space charge");
emittance_component("4d beamline element");
emittance_component("4d non-force");

# Set the solver tolerance
dtmax = 1e-13/DVR;
accuracy(6);

# Printtouts
tout(0.0, 1.01e-8/DVR, 1e-10/DVR);
```