Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Vector Potential Generation for Numerical Relativity Simulations[1] ZACHARY SILBERMAN, JOSHUA FABER[2], Rochester Inst of Tech, THOMAS ADAMS, ZACHARIAH ETIENNE, IAN RUCHLIN, West Virginia University — Many different numerical codes are employed in studies of highly relativistic magnetized accretion flows around black holes. Based on the formalisms each uses, some codes evolve the magnetic field vector B, while others evolve the magnetic vector potential A, the two being related by the curl: B=curl(A). Here, we discuss how to generate vector potentials corresponding to specified magnetic fields on staggered grids, a surprisingly difficult task on finite cubic domains. The code we have developed solves this problem in two ways: a brute-force method, whose scaling is nearly linear in the number of grid cells, and a direct linear algebra approach. We discuss the success both algorithms have in generating smooth vector potential configurations and how both may be extended to more complicated cases involving multiple mesh-refinement levels.

[1]NSF ACI-1550436
[2]Advisor

Zachary Silberman
Rochester Inst of Tech

Date submitted: 28 Sep 2016 Electronic form version 1.4