Abstract Submitted
for the OSS13 Meeting of
The American Physical Society

A New Algorithm for the of Numerical Computation of Gravitational Waves[1] MARIA BABIUC, Marshall University — Gravitational waves appear as solutions of Einstein's equations for phenomena such as binary black hole collisions, supernovas, pulsars, and the big bang. The correct modeling of gravitational waves is a key requirement for a meaningful detection and interpretation of data collected by gravitational wave observatories like LIGO. The numerical simulation of Einstein's equations is a very difficult computational problem, requiring highly stable and accurate numerical methods that can be efficiently implemented in non-trivial geometries and on parallel super-computers. The numerical relativity community recognizes that a well-posed method fulfills these requirements, but the issue of constructing well-posed numerical algorithms of the Einstein's equation is not trivial and will be addressed in this project. We start with the quasilinear scalar waves propagating on an asymptotically flat curved space background with source, in Bondi null coordinates, and strive to demonstrate analytically and to verify numerically the well-posedness of our algorithm. Next, we endeavor to develop and test a new computational boundary and evolution algorithm based on the well-posedness of characteristic initial value and boundary problems for a scalar wave.

[1]NSF grant PHY-0969709 to the Marshall University

Maria Babiuc
Marshall University

Date submitted: 21 Feb 2013 Electronic form version 1.4