

Abstract Submitted  
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**Second-Order Spectral Simulations of Black Hole Binaries**

NICHOLAS TAYLOR, Caltech — Successful spectral simulations of Einstein's equations currently require using a fully first-order formulation, which has the disadvantage of introducing additional constraints and equations. A novel pseudo-spectral penalty method for evolving second-order (in space) hyperbolic equations will be presented. With this method, the penalties are constructed as functions of Legendre polynomials and are added to the equations of motion everywhere, not only on the boundaries as is typical in first-order formulations. The application of this method to the second-order Einstein equations in generalized harmonic form, and especially to the simulation of an equal-mass black hole binary, will be presented and discussed.

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