

Abstract Submitted
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Adapted coordinates and the “eigenspectral” method for solving the periodic standing wave problem¹ BENJAMIN C. BROMLEY, University of Utah, CHRISTOPHER BEETLE, Florida Atlantic University, NAPOLEON G. HERNANDEZ, RICHARD H. PRICE, University of Texas at Brownsville — The Periodic Standing Wave (PSW) method describes the orbits of binary black holes and neutron stars in the limit when the inspiral is slow. Here, we describe a numerical approach for solving the binary problem in the PSW approximation. Our code uses grid-based finite differences and “adapted coordinates” whose spatial distribution is tuned for a binary pair of compact masses. We also motivate the need to use multipole filtering with “eigenspectral” functions, which are grid-based analogs of spherical harmonics. The geometry of the adapted coordinate grid allows only a relatively few low-order eigenspectral modes to carry nearly all of the physically relevant information, making the code both accurate and efficient. We present the results of several tests, starting with scalar models, linearized gravity, and a post-Minkowski treatment. Finally, we discuss progress toward solving the binary black hole problem in full General Relativity.

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