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A wavelet approach to binary blackholes with asynchronous multitasking HYUN LIM, ERIC HIRSCHMANN, DAVID NEILSEN, Brigham Young University, MATTHEW ANDERSON, JACKSON DEBUHR, BO ZHANG, Indiana University — Highly accurate simulations of binary black holes and neutron stars are needed to address a variety of interesting problems in relativistic astrophysics. We present a new method for the solving the Einstein equations (BSSN formulation) using iterated interpolating wavelets. Wavelet coefficients provide a direct measure of the local approximation error for the solution and place collocation points that naturally adapt to features of the solution. Further, they exhibit exponential convergence on unevenly spaced collection points. The parallel implementation of the wavelet simulation framework presented here deviates from conventional practice in combining multi-threading with a form of message-driven computation sometimes referred to as asynchronous multitasking.

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