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Solving Einstein's Equations Using Spectral Methods

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Spectral methods provide a promising approach for numerical solutions of the vacuum Einstein equations for spacetimes containing black holes. Besides offering exponential convergence for smooth solutions, these methods greatly simplify the treatment of boundaries, especially boundaries of excised regions inside black holes. A spectral code for solving multidimensional hyperbolic and elliptic equations is described, and preliminary simulations of binary black hole spacetimes using this code are presented.