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Further Studies of Binary Kerr-Schild Superposition Initial Data

SCOTT HAWLEY, Center for Relativity, University of Texas at Austin — Several choices of initial data sets for binary black hole evolutions (and gravitational-wave-source simulations) are currently available. The question of which of these (if any) is suitably "astrophysically relevant" will be answered in part by in-depth studies of the initial data themselves. We present a survey of Kerr-Schild type initial data sets for binary black hole spacetimes. The parallel multigrid method we use is an extension of a simpler solver [Hawley & Matzner, CQG 21, 2004] to the full set of Einstein equations. This method allows for high-resolution, large-domain solutions which constitute a substantial improvement over those of Bonning et. al [Phys.Rev. D68, 2003]. The results are in good agreement with those of the spectral code of Pfeiffer et al. [Phys.Rev. D66, 2002]. We continue the survey of parameter space begun in these earlier works to include a study of binding energy as a function of orbital parameters such as separation, spins, and velocities.

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