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Binary Black Hole Evolutions of Approximate Puncture Initial Data TANJA BODE, The Pennsylvania State University, FRANK HERRMANN, University of Maryland, IAN HINDER, Max-Planck Institute fuer Gravitationsphysik, PABLO LAGUNA, DEIRDRE SHOEMAKER, Georgia Institute of Technology, BIRJOO VAISHNAV, University of Texas at Brownsville — We present a study of numerical evolutions using an approximate, i.e. constraint-violating, non-spinning, equal-mass binary black hole initial data as proposed by Faye et al. (2004). Analysis of the waveforms from this approximate initial data and that of the constraint-satisfying initial data shows a match larger than 0.97 for an initial separation of 10M, well within the match required for signal detection. We also demonstrate the differences in the evolution are due to negative Hamiltonian constraint violations in the neighborhood of the punctures. We show these constraint violations behave as negative energy/matter clouds which lead to a decrease in the masses of the black holes, affecting the dynamics of the binary system.

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