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Binary Black Hole Initial Data Without Elliptic Equations[1] JEFFREY WINICOUR, Univ of Pittsburgh, ISTVAN RACZ, Wigner RCP, Budapest, Hungary — We describe a radically new method for solving the constraints of Einstein's equations which does not involve elliptic equations. Instead, the constraints are formulated as a symmetric hyperbolic system which can be integrated radially inward from an outer boundary. In this method, the initial metric data for a binary black hole can be freely prescribed, e.g. in a 4-dimensional superimposed Kerr-Schild form for the individual boosted black holes. Two pieces of extrinsic curvature data, which represent the two gravitational degrees of freedom, can also be freely prescribed by superimposing the individual black hole data. The remaining extrinsic curvature data are then determined by the hyperbolic constraint system. Because no puncture or excision boundary conditions are necessary, this approach offers a simple alternative that could provide more physically realistic binary black hole initial data than present methods. Here we present a computational framework for implementing this new method.

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