

Constructing high precision numerical binary black hole initial data

Abstract

We present a novel implicit numerical scheme for solving the constraints of general relativity in their parabolic-hyperbolic form. It is expected that by solving the constraints in a non-elliptic setting “junk radiation”—common to all elliptic formulations of the constraints—may be reduced significantly. The proposed method is unconditionally stable and has the advantage of not requiring the imposition of any boundary conditions in the strong field regime. In addition, the new method offers a holistic (all inclusive) approach to the construction of single and binary black hole initial data. The new implicit solver is used to construct initial data for several single and binary black hole configurations.

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