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Scheduled Relaxation Jacobi Method for Initial Data Problems VEDANT PURI, ROLAND HAAS, Univ of Illinois - Urbana, ELOISA BENTIVEGNA, University of Catania — Modeling scenarios in astrophysics with numerical relativity simulations requires the production of suitable initial data sets–a computationally expensive task that involves solving Poisson-like elliptic partial differential equations. To facilitate and accelerate the generation of initial data, we present a novel Scheduled Relaxation Jacobi (SRJ) method, a variant of successive over-relaxation schemes, coupled with a Newton-Raphson method. SRJ computes approximate relaxation factors with the goal of minimizing the number of iterations needed to cut down the residuals below specified tolerances. The well known Newton-Raphson methodology expands the SRJ method to nonlinear problems. We quantify the performance of our new method by computing initial data for the metric of a binary black hole system, and compare it to the solution obtained with TwoPunctures, a spectral solver in the Einstein Toolkit.

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