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Testing numerically the null Cauchy horizon singularity inside Kerr black holes LIOR BURKO, Georgia Gwinnett College and Alabama A&M University, GAURAV KHANNA, University of Massachusetts Dartmouth, ANIL ZENGINOĞLU, University of Maryland — The Cauchy horizon inside a Kerr black hole develops an instability that transforms it into a curvature singularity. Perturbative analyses are consistent with the picture arising from fully nonlinear simulations of spherical charged black holes: this singularity is deformational weak and null for early retarded times. Despite much interest in this long–standing problem, no numerical simulations of the interior of a perturbed Kerr black hole have been done to date. Here, we report on preliminary results obtained from a linear simulation of the evolution of the fields under the collapse of a test wave packet. We use recent developments to a Teukolsky equation solver, which use (event) horizon–penetrating, hyperboloidal coordinates, which compactify null infinity and penetrate through both horizons. This numerical technology allows us to penetrate through the event horizon, and probe the fields on the approach to the Cauchy horizon singularity. We study the behavior of the Weyl scalars ψ_0 and ψ_4 and of the curvature scalar $R_{\alpha\beta\gamma\delta}R^{\alpha\beta\gamma\delta}$, and confront our results with those of perturbation analysis. Our results may be useful when planning fully nonlinear numerical studies of rotating black hole interiors.

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