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Cauchy-horizon singularity inside perturbed Kerr black holes revisited GAURAV KHANNA, University of Massachusetts Dartmouth, LIOR BURKO, Georgia Gwinnett College, ANIL ZENGINOVGLU, University of Maryland — The Cauchy horizon inside a perturbed Kerr black hole develops an instability that transforms it into a curvature singularity. We solve for the linearized Weyl scalars ψ_0 and ψ_4 and for the curvature scalar $R_{\alpha\beta\gamma\delta}R^{\alpha\beta\gamma\delta}$ along outgoing null rays approaching the Cauchy horizon in the interior using the Teukolsky equation, and compare our results with those found in perturbation analysis. Two technological improvements on our code allow us to obtain results in better agreement with perturbation analysis: (1) The fields are "evolved" on the inner boundary as opposed to computed using the boundary conditions in conjunction with data from the "bulk," and (2) we use a fifth-order WENO finite-difference scheme with third-order Shu-Osher explicit time-stepping. Our results corroborate the perturbation analysis result that at its early parts the Cauchy horizon evolves into a deformationally-weak, null, scalar-curvature singularity. We further find the first numerical confirmation for the perturbative results for $\psi_0(u = \text{const}, v)$, $\psi_4(u = \text{const}, v)$, and for $R_{\alpha\beta\gamma\delta}R^{\alpha\beta\gamma\delta}(u = \text{const}, v)$, where u, v are retarded and advanced times, respectively.

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