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Analytical conformal compactification of Schwarzschild spacetime

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Almost all the time the causal structure of the Schwarzschild manifold is illustrated, the diagram introduced in the classical textbook by Misner, Thorne and Wheeler is used. It is known that coordinate transformations giving rise to this diagram are not angle-preserving (conformal) at infinity. Although several transformations were proposed to make the compactified Schwarzschild spacetime look similarly to the compactified Minkowski spacetime near infinities, these transformations do not cover smoothly \mathcal{J}^{\pm} . We explain how to find the coordinates covering the complete Schwarzschild manifold as well as its extension beyond \mathcal{J}^{\pm} . We also show, that having such analytic compactification can improve convergence in numerical problems including both horizon and \mathcal{J}^{\pm} .