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Rotating Black Holes in Shape Dynamics GABRIEL HERCZEG, HENRIQUE GOMES, UC Davis — Shape dynamics is a classical theory of gravity which agrees with GR in many important cases, but which possesses different gauge symmetries. Recently, it was shown that shape dynamics admits a Birkhoff theorem. The unique, spherically symmetric solution obtained is distinct from the corresponding solution for GR, the Schwarzschild spacetime. It is free of physical singularities, and while it possesses a horizon, it does not form a spacetime there. Here, we present a general procedure for (locally) mapping stationary, axisymmetric GR solutions onto their shape dynamic counterparts. This mapping furnishes the local form of the most general stationary, axisymmetric Shape Dynamics solution up to gauge transformations. We focus in particular on the rotating black hole solution for shape dynamics and show that many of the properties of the spherically symmetric solution are preserved in extending to the axisymmetric case: it is free of physical singularities, it does not form a spacetime at the horzion, and it possesses an inversion symmetry about the horizon.

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