Gravitational lensing in the Simpson-Visser spacetime: Can the shadow distinguish between Schwarzschild and regular black holes?

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We study the null geodesic flow in the spacetime recently proposed by Simpson and Visser, that interpolates between the Schwarzschild solution, a family of regular black holes (BHs), and a family of traversable wormholes belonging to the Morris-Thorne class. We compute the shadow of the BH sub-families analytically. Moreover, we apply a numerical backwards ray-tracing method in order to simulate the optical perception of an observer in this spacetime, exhibiting its gravitational lensing. In particular, we show that there is degeneracy between the shadow of the regular BHs and that of comparable Schwarzschild BHs, for far away observers.