

Figures of Lecture 2: The Schwarzschild black hole

Éric Gourgoulhon

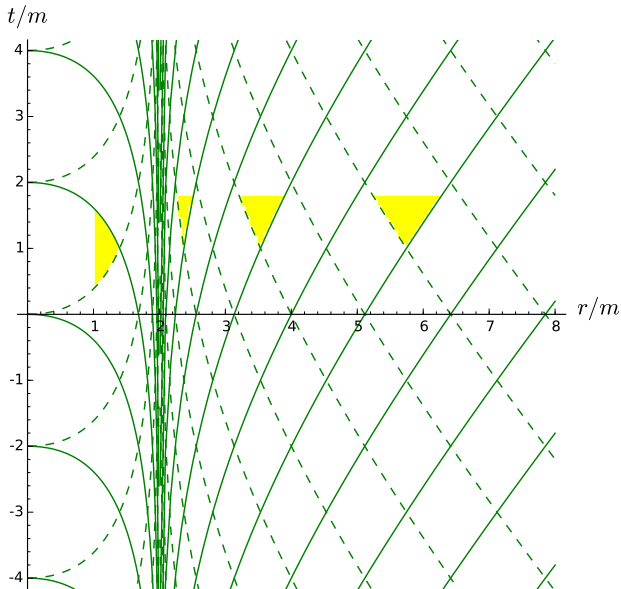
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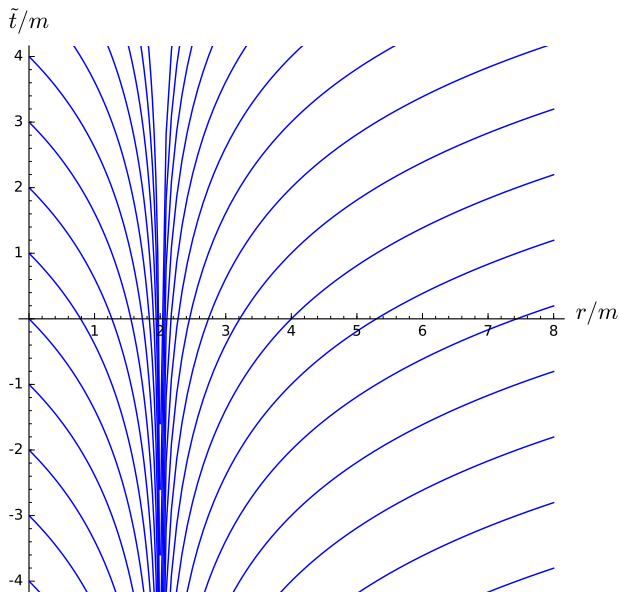
CP3, UCL, Louvain-la-Neuve
29 November 2016

<http://luth.obspm.fr/~luthier/gourgoulhon/bh16/louvain/>

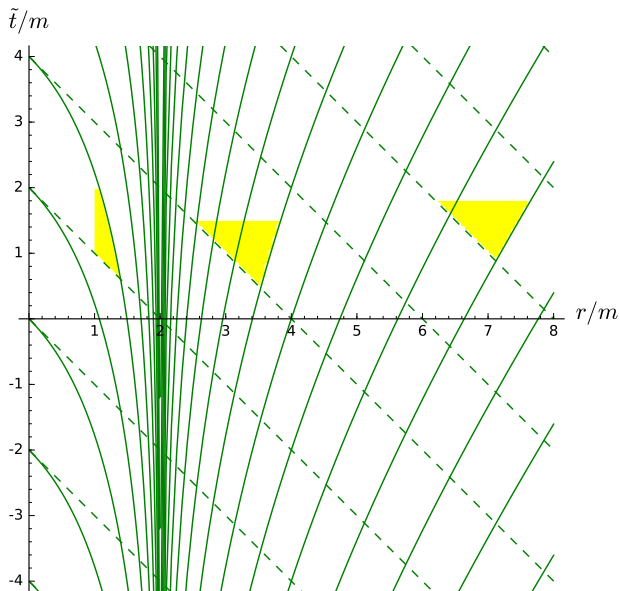
Radial null geodesics in Schwarzschild-Droste coordinates



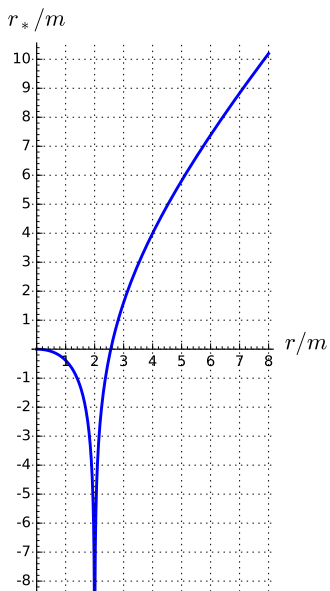
Constant t hypersurfaces in terms of IEF coordinates



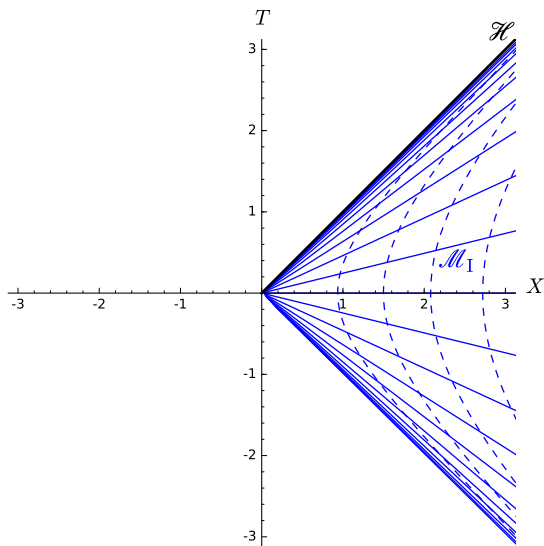
Radial null geodesics in IEF coordinates



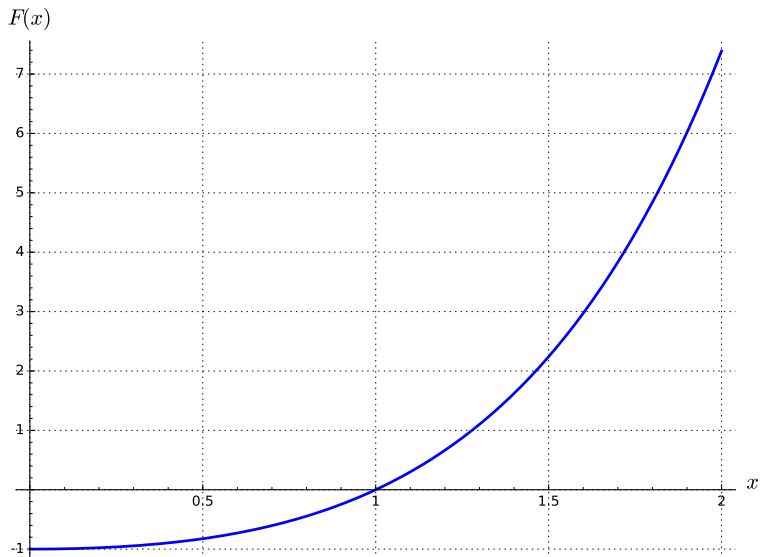
Tortoise coordinate



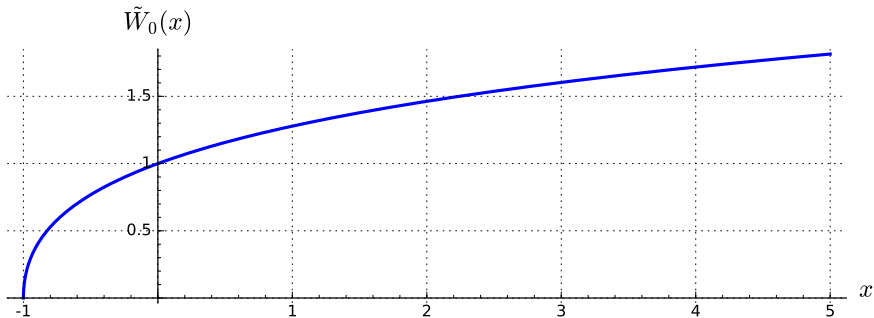
\mathcal{M}_I in terms of KS coordinates



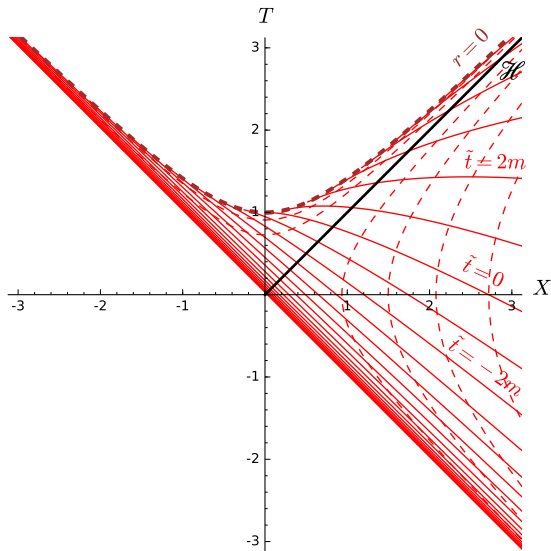
Function $F : x \mapsto e^x(x - 1)$



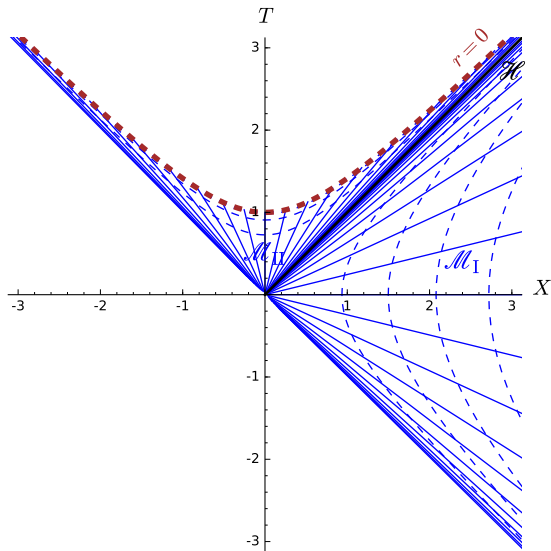
Rescaled Lambert function



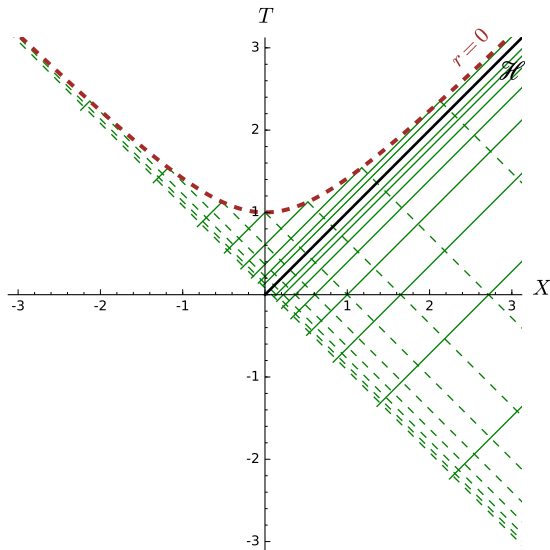
IEF coordinates in terms of KS coordinates



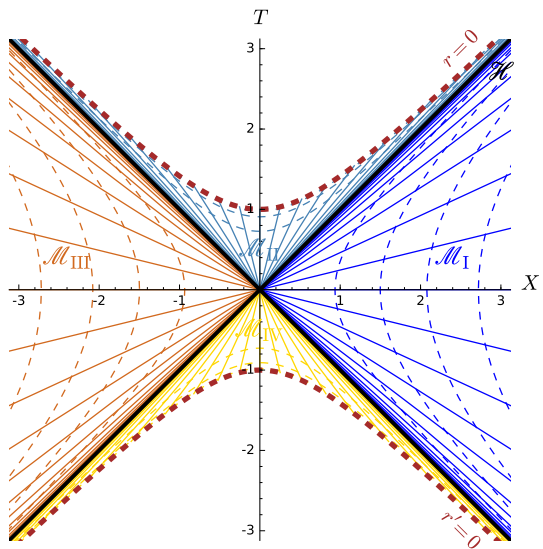
SD coordinates in terms of KS coordinates



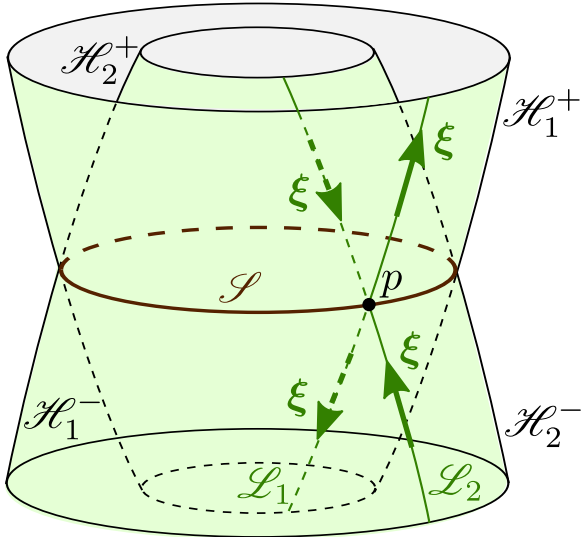
Radial null geodesics in the IEF domain



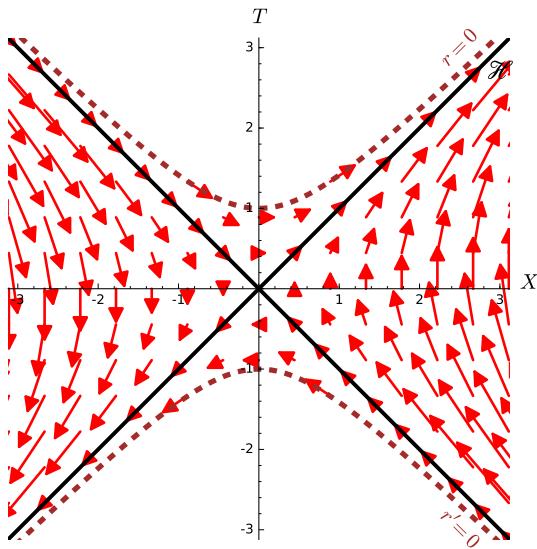
Kruskal diagram



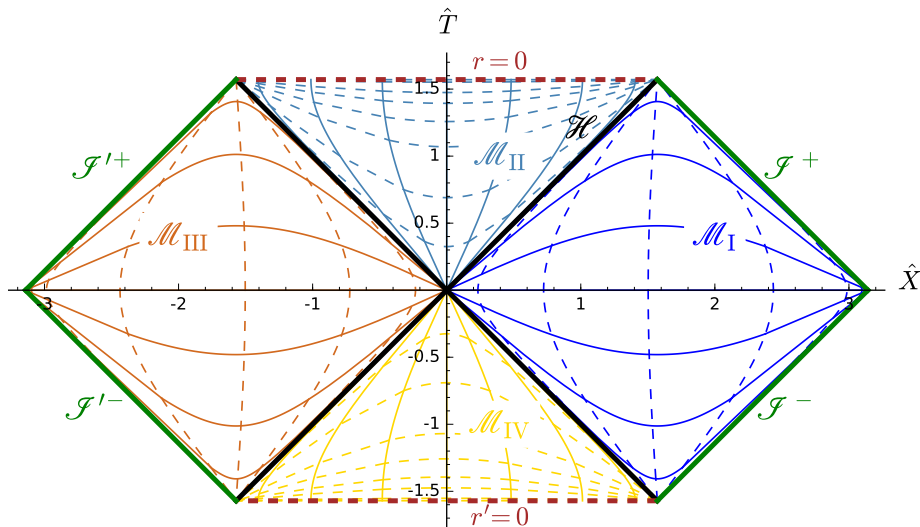
A bifurcate Killing horizon



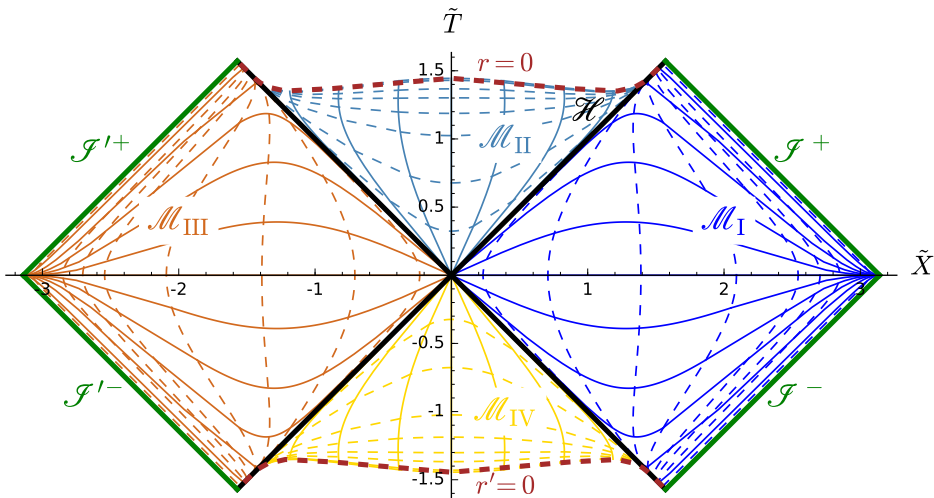
Stationary Killing vector ξ



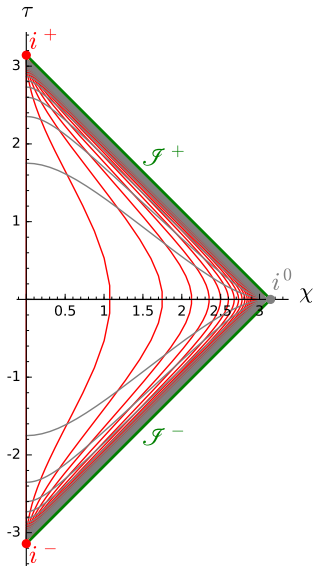
Standard Carter-Penrose diagram (singular at \mathcal{I})



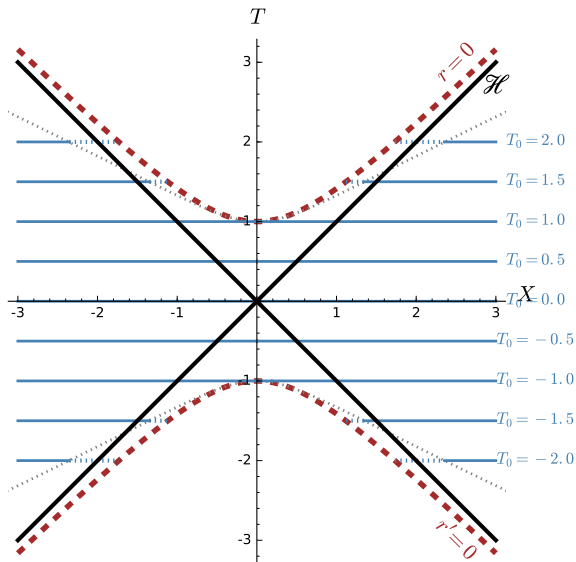
Carter-Penrose diagram based on Frolov-Novikov coordinates



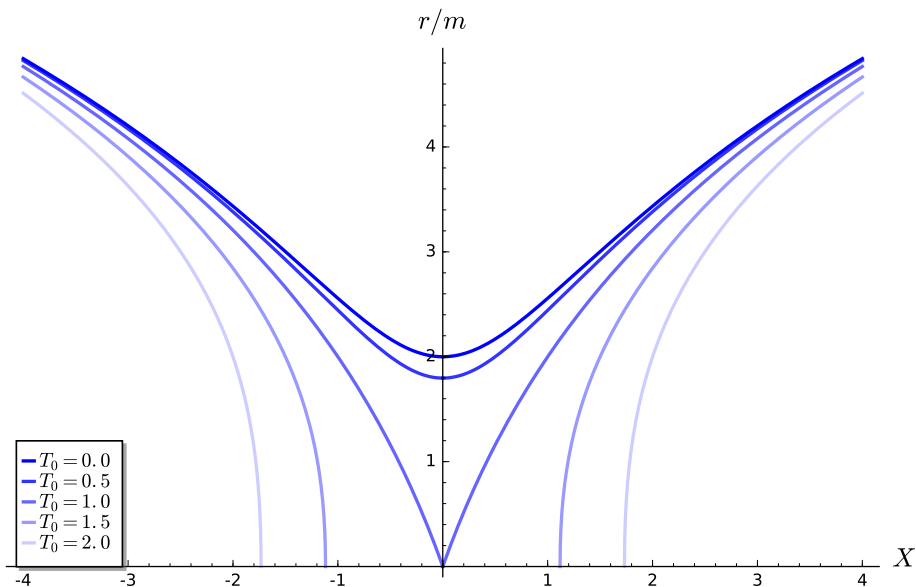
Comparison with the conf. diagram of Minkowski spacetime



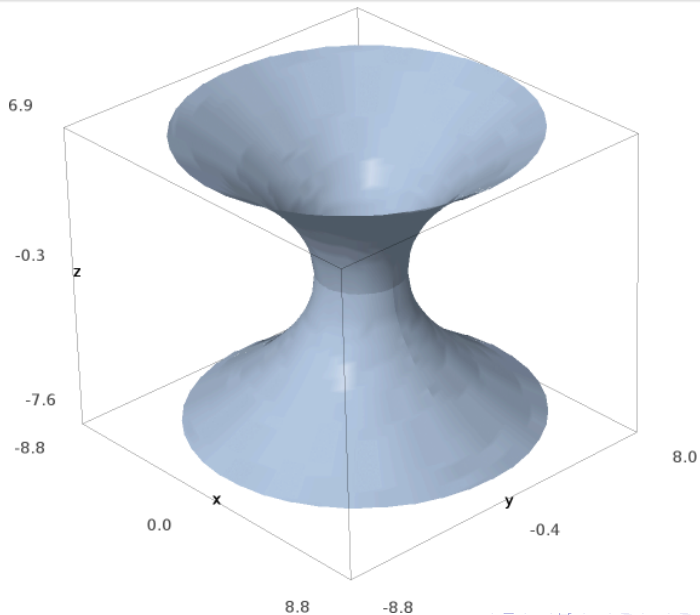
Constant KS-time hypersurfaces Σ_{T_0}



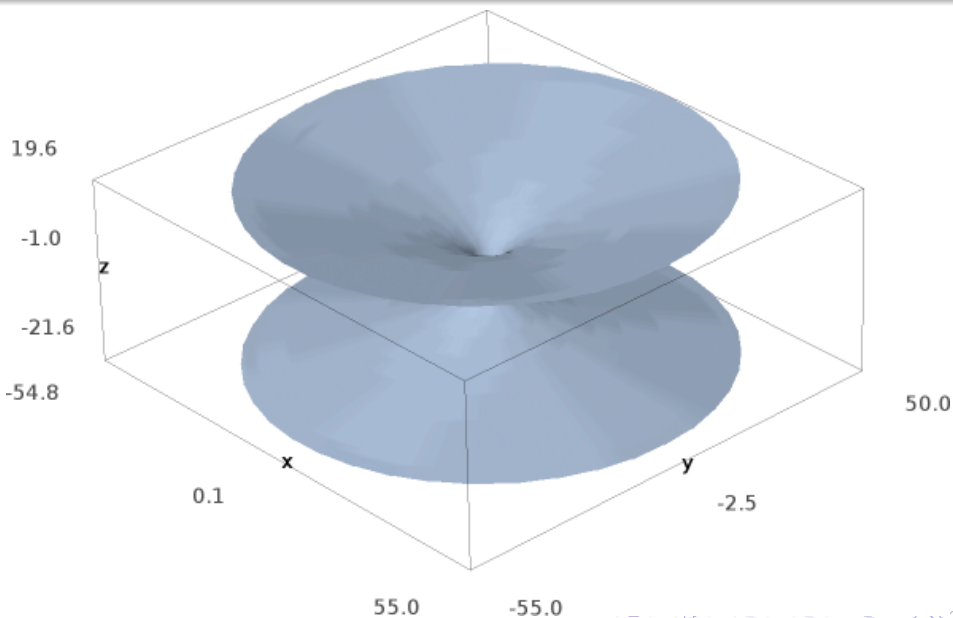
Areal radius as a function of X on Σ_{T_0}



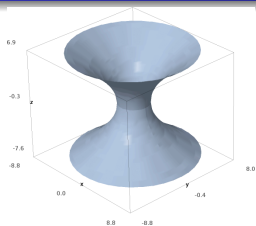
Flamm paraboloid



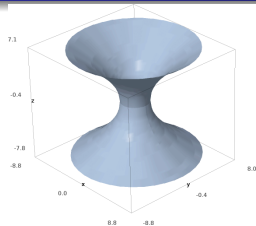
Flamm paraboloid (zoom out)



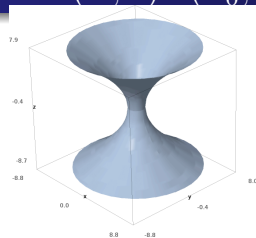
Sequence of isometric embeddings of slices $(T, \theta) = (T_0, \frac{\pi}{2})$



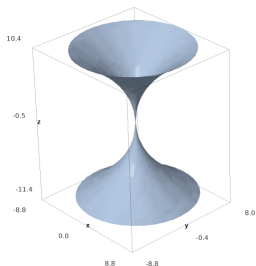
$$T_0 = 0$$



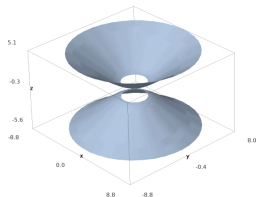
$$T_0 = 0.5$$



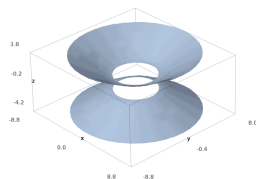
$$T_0 = 0.9$$



$$T_0 = 1$$



$$T_0 = 1.5$$



$$T_0 = 2$$

Areal radius r in terms of the isotropic coordinate \bar{r}

