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Evolution and bifurcation of marginally outer trapped surfaces

Marginally outer trapped surfaces (MOTS) are a useful proxy for black hole horizons, and are an important tool in the study of binary black hole mergers. Their smooth evolution (or lack thereof) is governed by the associated stability operator L. If L is invertible, then the MOTS evolves smoothly into a marginally outer trapped tube (MOTT). When L is not invertible the problem is more delicate, and one must use tools from bifurcation theory to study the resulting evolution. A result in this direction was given by Andersson, Mars, Metzger and Simon in 2009. In this talk I will present a refinement of their result, giving sufficient conditions for a MOTS to undergo a saddle-node bifurcation, and illustrate it with simple examples. This talk represents joint work with Liam Bussey and Hari Kunduri.