Abstract Submitted
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The relative stability of black hole threshold solutions in gravitational collapse THEODOR BRASOVEANU, FRANS PRETORIUS, Princeton University — We present numerical studies of the relative stability of critical solutions in problems of gravitational collapse. These strong-field solutions to Einstein equations, initially discovered by M. Choptuik, arise at the threshold of black hole formation. We study the evolution of systems with multiple matter sources (such as scalar or Yang-Mills fields) that exhibit the same type of threshold solution when studied individually and only interact with each other gravitationally. Given the unstable nature of critical solutions, the central question that we address is how does matter of one type behave in the presence of a critical solution of another type of matter. Preliminary results, using adaptive grid techniques to solve Einstein equations coupled to matter, indicate that the near-critical solution of the combined system seems to switch from one type of threshold to another, as the critical point is approached in parameter space. The overall dynamics (exhibiting time-periodicity or self-similarity) depends on the relative amounts of energy present in the system and on the overlapping region of the fields.

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