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Radiation Magnetohydrodynamics in Dynamical Spacetimes: 'Thermal' Oppenheimer-Snyder Collapse TSZ KA LI, BRIAN FARRIS, YUK TUNG LIU, STUART SHAPIRO, University of Illinois at Urbana-Champaign — We have constructed a new general relativistic code capable of evolving magnetohydrodynamic fluids and radiation fields in a dynamical spacetime. In order to test our code's ability to handle radiation in a strong-field dynamical spacetime, we simulate the collapse from rest of a spherical dust ball, slightly perturbed by a small fluctuation of thermal radiation. For a sufficiently small perturbation, the matter and metric evolve according to an Oppenheimer-Snyder solution, while the radiation propagates according to the general relativistic diffusion approximation. Adopting a grey-body opacity law, and an optically thick medium, we evolve the metric, hydrodynamics and radiation fields self-consistently using our new code. We find good agreement between the numerical result and the analytic solution.

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