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Numerical simulations of gravitational singularities DAVID GARFINKLE, Oakland University — Numerical simulations are performed of the formation of singularities in gravitational collapse. The spacetimes have no symmetry and are therefore likely to reflect the general behavior of systems under gravitatonal collapse. As the singularity is approached, spatial derivatives in the Einstein field equations become negligible compared to time derivatives. The dynamics at each spatial point thus reduces to the dynamics of a homogeneous spacetime, though a different one for each spatial point. This dynamics can be described using three scale factors, one for each direction in space. For vacuum spacetimes the behavior of these scale factors is oscillatory and chaotic, while for matter with a stiff equation of state, there is a power law behavior of the scale factors as the singularity is approached.

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