

Abstract Submitted
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Why Enforce the Hamiltonian Constraint in Numerical Relativity? BEVERLY K. BERGER, National Science Foundation — The indefinite sign of the Hamiltonian constraint means that solutions to Einstein's equations must achieve a delicate balance — often among almost canceling large terms. If numerical errors cause violation of the Hamiltonian constraint, the failure of the delicate balance can lead to qualitatively wrong behavior rather than just a lesser accuracy. This issue is different from instabilities caused by constraint-violating modes. Examples of numerical simulations of collapsing cosmological spacetimes exhibiting local mixmaster dynamics with and without Hamiltonian constraint enforcement will be presented. Criteria to relate a measure of constraint violation to the time scale for the development of wrong behavior will be discussed.

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