

Symmetric hyperbolic formulations in linearized gravity

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Abstract

Propagation of gravitational waves that can carry important information about a distant cosmic event is described by Einstein's theory of relativity. Numerical simulation of gravitational phenomena represents one of the greatest challenges in computational mathematics. The talk will address a major aspect of numerical relativity, the choice of governing equations. We will start with an informal introduction to the problem and a brief review of basic concepts of general relativity. Then we will describe the time-space decomposition of the Einstein equation and will show why the original equations need to be reformulated for computations. The main part of the talk will be devoted to the sources, ideas, and implementations of hyperbolic formulations for the Einstein equation. We will conclude with an overview of the open questions in the field.