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Steps towards the well-posedness of the characteristic evolution for the Einstein equations[1] MARIA BABIUC, Marshall University — The correct modeling of gravitational radiation is a key requirement for a meaningful detection and interpretation of data. The Cauchy-characteristic technique connects the strong-field Cauchy evolution of the space-time near the black-hole merger to the characteristic evolution at future null infinity, where the waveform is properly defined. The PITT Null code, publicly available, is the most precise and refined computational method for the extraction of gravitational waves, but is not well-posed. The numerical relativity community recognizes that a well-posed problem is the only way to ensure that a code is stable and dependable. The well-posedness of the null-timelike problem for the Einstein equations is not yet established. We present our progress towards developing and testing a new computational evolution algorithm based on the well-posedness of characteristic initial value and boundary problems for a scalar wave. We strive to demonstrate analytically and to verify numerically the well-posedness of our algorithm for quasilinear scalar waves propagating on an asymptotically flat curved space background with source, in Bondi null coordinates. We design and test a new boundary algorithm. Tests confirm the stability properties, and reveal interesting qualitative features.

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