

Title: On waveform-relaxation type methods for wave-type equation

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The parallel-in-time integration of wave-type equations is well known to be a difficult task.

When applying classical waveform-relaxation (WR) and parareal type methods, one generally experiences

rapid error growth before reaching convergence in a finite number of iterations.

This negative behavior prevents, in general, the successful application of these domain decomposition

methods. In this talk, the focus is on WR-type methods. Classical WR convergence analyses use classical Laplace/Fourier techniques. However, these approaches provide analyses for unbounded time

intervals, and do not allow one to describe precisely the WR converge behavior on finite time intervals. In this talk, we present a novel analysis based on the methods of characteristics, which allows us, on the one hand, to obtain a detailed characterization of the error growth along with the iterations and, on the other hand, to introduce a new parallel-in-time computational strategy.

Numerical experiments support our new theoretical and numerical findings.

This is a joint work with Martin J. Gander and Ilario Mazzieri.