Time domain Maxwell equations and Schwarz Waveform Relaxation methods

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A short historical introduction to Schwarz Waveform Relaxation (SWR) method and its optimized versions will be presented. Those will then be applied to the time domain Maxwell equations. We present and study optimized transmission conditions for Maxwell's equations, and show some analogies between the Maxwell equations and the wave equation. We first recall a result stating that the wave equation solved with the SWR method converges in a finite number of steps depending on the time window and the overlap, and show that the same is true for Maxwell's equations. Then we emphasize the strong link between the wave equation and the time domain Maxwell equations, and use this link to show how one can obtain optimized local transmission conditions from the previously defined optimal transmission conditions. This effort emphasizes the wave behavior of solutions of Maxwell's equation and uses results for the wave equation in order to simplify the analysis.