1035-65-1497 **Mohammad Al-Khaleel*** (khaleel@math.mcgill.ca) and **Martin J. Gander**. *Optimized waveform relaxation methods for circuit simulations.*

Waveform Relaxation (WR) methods have been widely used in several fields for solving large systems of ODEs where the standard methods can become inefficient: in applying traditional methods directly to large systems, the same method and stepsize need to be used for every differential equation in the system, which implies an identical discretization, and this identical discretization must be fine enough to represent all components accurately, including both the rapidly and slowly changing state variables in the system. The classical WR methods which have been proposed to overcome this drawback based on partitioning techniques lead to a slow and nonuniform convergence over the time interval for which the equations are integrated. A new approach called optimized WR algorithms was recently introduced which greatly improved convergence by using new transmission conditions. These conditions are responsible for the exchange of information between the subsystems which we obtain by decomposing the original large system. In this talk we demonstrate that the transmission conditions have a tremendous influence on the convergence of the WR algorithms for circuit simulations. We consider in particular RC type circuits to illustrate the theory and the performance of the new WR methods. (Received September 20, 2007)