

In this thesis we consider a nonlinear time-dependent heat equation, from which we derive a system of ordinary differential equations using the finite element method. We focus on the parallel parareal method for this system of equations. The implicit Euler method is used to discretize the ODR system and the iterative Kachanov method is used to solve the corresponding nonlinear system of algebraic equations. Special attention is paid to the adaptive choice of the time step. We then solve the concrete problem in the Fortran language and focus on the convergence of the parallel solution to the fine computed solution. We also observe the theoretical parallel acceleration in terms of the time steps performed.