ANALYSIS OF NON-SIMULTANEOUS NUMERICAL BLOW-UP IN SYSTEMS OF HEAT EQUATIONS WITH n COMPONENTS AND NONLINEAR BOUNDARY CONDITIONS

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Abstract: This paper concerns the study of a numerical approximation for a system of heat equations with n components and nonlinear boundary conditions. We show that the solution of the semidiscrete problem, obtained by the finite difference method, blows up in finite time. We also establish conditions under which non-simultaneous or simultaneous blow-up occurs for the semidiscrete problem. After proving the convergence of the numerical blow-up time, we conclude by presenting numerical results that illustrate key aspects of our study.

Keywords and Phrases: System of heat equations, n components, semidiscretization, non-simultaneous blow-up, simultaneous blow-up, convergence, numerical blow-up time, arc-length transformation, Aitken's Δ^2 method.