Method of lines for Sobolev type equations

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Abstract

We consider the first initial boundary value problem for the following nonlinear Sobolev type equation with a rapid growing nonlinearity

$$\frac{\partial}{\partial t}\left(\Delta u - u\right) + e^u = 0 \quad \text{on} \quad \Omega \times [\,0, T\,].$$

Here $\Omega \subset R^n$ is a bounded domain with smooth boundary and Δ is the Laplace operator with respect to the spatial variable. The unique solvability in the classical sense for this problem is proved by M. O. Korpusov and A. G. Sveshnikov. Estimates for the time of the blow-up are given.

We are interested in numerical solving such problem. Stability of the method of lines is investigated.

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