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On sharp error estimates in L_2-norm for methods of solving the heat equation in non-smooth data classes

Various locally one-dimensional and vector splitting methods of the approximation order $O(\tau^k + h^2)$ $(k = 1, 2)$ of solving the initial boundary value problem for the heat equation are studied. For $k = 1$, the optimal error estimates $O(\tau + h^2)$ and the derivatives error estimates $O(\sqrt{\tau} + h + \tau/h)$ from above and from below are derived for right-hand side $f \in L_2(Q)$ and the initial function $u_0 \in \overset{\rightarrow}{\circ} W_2^1(\Omega)$. Besides, there is the set of the estimates for less regular f, u_0. For $k = 2$, the sharp error estimates $O(\tau^2 + h^2 + \tau^2/h^{2(1-\lambda)})$ $(\lambda \in [0, 1])$ are derived for corresponding classes of f, u_0. Most of the estimates is inferior in order to the estimates for the implicit and Crank-Nicolson methods. These results are achieved jointly with A. A. Zlotnik and supported by the RFBR (grant 97-01-00214).

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