ON A SIDEWAYS PARABOLIC EQUATION [1]

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Abstract

The sideways parabolic equation in the quarter plane

$$\begin{aligned} u_t = a(x)u_{xx} + b(x)u_x + c(x)u, &\qquad x \in (0,\infty), \quad t \in (0,\infty), \\ u(1,t) = g(t), &\qquad t \in (0,\infty), \\ u(x,0) = 0, &\qquad x \in (0,\infty) \end{aligned}$$

is considered. This is a model of a problem, where one wants to determine the temperature on both sides of a thick wall, but one side is inaccessible to measurements. This problem is well-known to be severely ill-posed: a small perturbation in the data g may cause dramatically large errors in the solution. The results available in the literature are mainly devoted to the case of constant coefficients, where one can find an explicit representation for the solution to the problem. In this note a stability estimate of Hölder type for the solution of this general problem is established, it is also shown how to apply the mollification method proposed by the first author ([1, 2, 3]) to solve the problem in a stable way.

References

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