TOWARDS LINEAR INVERSE HEAT CONDUCTION PROBLEMS [1]

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Abstract

In many engineering contexts it is sometimes required to calculate the transfer surface heat flux, the surface temperature, and to determine the heat capacity, the heat transfer coefficient,... from a temperature history measured at fixed locations inside the body. These problems are well known under the name "inverse heat conduction problems" (IHCPs) and lead us mainly to consider the following noncharacteristic Cauchy problem for (linear and nonlinear) parabolic equations of the form

$$\begin{aligned} \mathcal{P}u(x,t) &= u_t(x,t),\ 0<x<1,\ 0<t\le T, \\ \text{"surface temperature"}|_{x=0} &= \varphi(t),\ 0<t\le T, \\ \text{"surface heat flux"}|_{x=0} &= g(t),\ 0<t\le T, \end{aligned} \qquad (*)$$

where $\mathcal{P}$ is an elliptic operator, φ and g are given functions. We emphasize that *the initial condition at $t=0$ is not given!* These problems are well known to be *severely ill-posed* (see [5]). In this paper we shall give a survey of our recent results on these problems. For a further work, and a detailed analysis we refer to [1]-[8].

References

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