STABLE NUMERICAL SOLUTION TO LINEAR INVERSE HEAT CONDUCTION PROBLEMS BY THE CONJUGATE GRADIENT METHOD [1]

Dinh Nho Hào

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H.-J. Reinhardt

Universität - Siegen, FB Mathematik, 57068 Siegen, Germany

Abstract

In this paper a stable numerical procedure based on the conjugate gradient method (CGM) for linear inverse heat conduction problems (IHCPs) with coefficients non-smooth and depending on time is suggested. In contrast to the other related papers, we do not assume that the initial condition is given. By the remarkable results of Nemirovskii [**?**] on the optimal order regularization properties of the CGM for linear ill-posed problems we obtain a very good approximation to the surface temperature if we are away from the end of the time interval. Being aware of the observation by Eldén [**?**] (and by Knabner [**?**]) that it is impossible to determine the surface temperature at the end of the time interval, we extend the coefficients of the IHCPs and the Cauchy data in an appropriate way to a larger time interval, then solve the "extended" IHCPs by Nemirovskii's CGM for ill-posed problems. After doing that we take only the values of the surface temperature in the original time interval.

[1] In: J. Inverse and Ill-posed Problems **3**(1996), 447-467