

FUNDAMENTAL SOLUTION METHOD FOR SOLVING SOME INVERSE HEAT CONDUCTION PROBLEMS

Y.C. HON AND T. WEI

Abstract. In this paper, we apply fundamental solution method and global time scheme to solve some one-dimensional inverse heat conduction problems. The main idea of this method is to express the approximate solution for IHCP as an expansion of basis functions which are deduced by fundamental solution of the homogeneous heat equation. Hence the solution satisfies equation in the internal region exactly. By using global collocation on the boundary and time interval, one can easily obtain an approximate solution via solving a linear system of equations which is given by boundary conditions. In our numerical computation, we use the Tikhonov regularization and L-curve method to treat the discreted ill-conditional linear systems. The proposed method results in a global collocation and hence eliminates the need for discretization of domain as well as any numerical integration. Several examples are shown to demonstrate the efficiency of our new approach.

Department of Mathematics, City University of Hong Kong, Tat Chee Avenue, Kowloon
Tong, HongKong

E-mail address: maychon@cityu.edu.hk

Department of Mathematics, Lanzhou University, Lanzhou, Gansu Province 730000,
China

E-mail address: tingwei@lzu.edu.cn

Date: December 17, 2001.

1991 Mathematics Subject Classification. 65N, 35R.

Key words and phrases. Inverse heat conduction problem, Fundamental solution method,
Global time scheme.