Optimal Design Parameters for a Parabolic Inverse Problem

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Abstract

We focus on issues bearing on the practical implementation of a numerical algorithm for an inverse problem for the heat equation. One induces a heat flux on a portion of the boundary of an object, measures the temperature-response on that boundary portion, and uses this information to determine a hidden portion of the boundary. This has important applications to corrosion detection and non-destructive testing. Practical implementation of the relevant numerical algorithm requires many decisions to be made, such as the input heat flux pattern and the time period over which the temperature-response data is to be measured. We will present mathematical analysis which provides guidance in making these (and other) decisions in an intelligent way.