Identification of transmissivity coefficient reconstructing high-order derivatives

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Abstract

In a variety of applications, we have the problem to find a coefficient a(x) in some mathematical models. Recently, due to the changes in the structure or in different properties which the materials undergo, researches have been interested in the problem of reconstruction to the coefficient a(x) when some data is known. Unfortunately, when solving the issue under simpler conditions, it is necessary to calculate first derivatives, second-order derivative and it is wellknown that working with noisy date, while calculating such a derivative is an illposed problem. The special case of stabilization of the first-order derivative has been studied since different approaches: using the mollification method, iterative methods and the Tikhonov regularization. In this talk, a new method of reconstructing a derivative of any order will be presented. By reconstructing the fourth-order derivative, lower order derivatives can be stabilized and, hence, the coefficient, a(x), can be found. All these processes will be shown, including some examples of interest. Finally, a comparison between the proposed method and other methods will be presented.