Abstract

The inverse problem of determining a coefficient (possibly discontinuous) of principal part for parabolic equations has important applications in a large fields of applied science such as heat conduction and hydrology. Hence, the major objective of this thesis is to review the recent results about inverse parabolic problems with discontinuous principal coefficient concerning uniqueness, stability and existence of solution to these problems.
We start by presenting some popular inverse problems in partial differential equations and indicate their applications. Afterward, in part two we study in particular the inverse problems of parabolic partial differential equations. In part three, we review some numerical methods for solving these problems. In part four, we move towards studying these problems with discontinuous principal coefficient, where in this part the uniqueness of recovery of the discontinuous conductivity of a parabolic equation is presented and a numerical solution for an inverse diffusion problem is reviewed.
Finally, the solution of some inverse parabolic problems using Adomian decomposition method is studied and we will try to solve these problems with discontinuous principal coefficient using the mentioned method.

Keywords: inverse problems, inverse parabolic problems, discontinuous principal coefficient, ADM.