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AN ADAPTABLE TECHNIQUE FOR SOLVING LINEAR TWO-DIMENSIONAL FUZZY INTEGRAL EQUATIONS

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Abstract. In this paper, an adaptable numerical technique for solving linear two-dimensional fuzzy integral equations of the second kind is deduced by using homotopy perturbation method. The detailed description of the algorithm is provided. The solution is expressed in the form of easily computable components to acquire quite acceptable fuzzy approximate solution. Parametric forms of fuzzy numbers are used. Proof of convergence of this method is also discussed. Numerical examples are given to demonstrate the competence of the presented method and the results reveal that the numerical scheme is adaptable and convenient for obtaining results with high accuracy.

Keywords. two-dimensional fuzzy integral equations; fuzzy functions; parametric forms; convergence; homotopy perturbation method; approximate solutions.

AMS (MOS) subject classification: 03B52, 45B02, 45D02.

1 Introduction

Integral equations are one of the most powerful mathematical tools in both pure and applied sciences. They are inextricably related with other areas of mathematics such as integral transforms, functional analysis and so forth. They are important in studying and solving a large proportion of real problems in various topics which includes oscillation theory, electrodynamics, electrostatics, biomechanics, population dynamics, demography, signal processing, magnetism, semi-conductor devices, study of viscoelastic materials, etc., Usually in many interesting and fascinating applications, some of the parameters in our problems are represented by fuzzy number than in the crisp state and hence it is important to develop mathematical models and numerical techniques for solving general fuzzy integral equations. As these equations are usually hard to solve analytically and as the exact solutions are scarce, it would be better to employ adaptable numerical technique. Fuzzy theory was