

AN APPROXIMATE MATHEMATICAL SOLUTION FOR GLUCOSE INSULIN REGULATORY SYSTEM USING HOMOTOPY PERTURBATION METHOD

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Abstract. Mathematical modelling is a powerful tool for medical research. This research report targets to investigate the most accurate approximate solution of system of fuzzy linear differential equations (FLDE) using Homotopy Perturbation Method (HPM). It is found that the solution obtained by HPM is closer to the exact solution. By considering the numerical example on Glucose-Insulin Regulatory System (GIRS). In the numerical examples we find the capability of the method by comparison with the exact solution of fuzzy linear systems on GIRS model and dynamics of drug therapy model.

Keywords. Fuzzy number, Fuzzy differential equations, Homotopy Perturbation Method, Mathematical model, glucose-insulin regulatory System, drug therapy model.

AMS (MOS) subject classification: 93A30, 34A12, 34D10, 92C50.

1 Introduction

Nowadays solving the differential equations is very essential because most of the dynamical phenomena are constructed as a mathematical model using differential equations. Theory of fuzzy differential equations (FDE) gives a powerful role in modelling science and engineering by its natural way to model the system under uncertainty [1, 14].

Every model for biological system has impreciseness. On biological model, there are so many works done with imprecise data. So, the necessity for taking the imprecise parameters in a model is the recent topic. Sometimes the parameters may be fuzzy or an interval. Here we consider a biological problem model associated with FDE [15].

The idea FDE has been rapidly developing in recently. It has wide range of application in many branches of engineering and also in the field of medicine.