

SOLVING A FUZZY INITIAL VALUE PROBLEM WITH AN INDICATOR OPERATOR

Ömer AKIN

TOBB ETU, Ankara

omerakin@etu.edu.tr

Konuşma Özeti

Fuzzy initial value Problems for differential equations are having more and more attention in the literature. It is known that a lot of real life problems can be modeled with differential equations. Aerodynamics, populations and economics are some of the examples having models as differential equations. Specially, second order differential equations with constant coefficients are the popular part of applied mathematics

In this study we try to solve an initial fuzzy value problem given as

$$y''(x) + a_1y'(x) + a_2y(x) = \sum_{i=1}^r \bar{b}_i g_i(x); \quad y(0) = \bar{\gamma}_0; y'(0) = \bar{\gamma}_1$$

where a_1 and a_2 are real constants and $g_i(x)$ ($i = 1, \dots, r$) are continuous functions on the interval $[0, \infty)$, subject to the initial conditions $\bar{\gamma}_0, \bar{\gamma}_1$ and forcing coefficients \bar{b}_i ($i = 1, \dots, r$) for fuzzy numbers.

Fuzzy differential term was conceptualized by Kendall and Byatt. Here, we applied Zadeh's Extension Principle and obtained the analytical form of alpha cuts for the solution of the fuzzy initial value problem with the aid of an indicator operator

References

- [1] Akin O., Khaniyev T., Oruc O., Turksen I.B, Some Possible Fuzzy Solutions For Second Order Initial Value Problems Involving Forcing terms, The International Journal of Applied and Computational Mathematics, V.13.N.2, 2014 (June issue).
- [2] Akin O., Khaniyev T., Oruc O. and Turksen I.B., An algorithm for the solution of second order fuzzy initial value problems, Expert Systems with Applications, 40(3), 953–957 (2013)

- [3] S.P.Mondal, T.K.Roy, First Order Linear Non Homogeneous Ordinary Differential Equation in Fuzzy Environment, *Mathematical Theory and Modeling*, 3 (2013) 85–95 .
- [4] Buckley J.J. and Feuring T., Fuzzy differential equations, *Fuzzy Sets and Systems*, 110, 43–54 (2007).
- [5] Kandel A. and Byatt W.J, Fuzzy differential equations, In proceedings of International Conference on Cybernetics and Society, 1213–1216, Tokyo, Japan (1978).