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Analysis of Solutions to Equations with a Generalized Derivative and Delay

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Abstract: This paper is concerned with the set-valued differential equations with a generalized derivative and constant delay. We introduce the notion of the initial problem solutions and establish conditions for their existence and uniqueness, also we provide a result on the continuous dependence of the solution of this problem on the initial function. It is found that the solutions of such equations can expand and contract, depending on the initial conditions. Also, in this paper we develop a numerical algorithm to calculate solutions to such problem approximately. By means of examples, we demonstrate how this algorithm works when solving different nonlinear differential equations with generalized derivative with constant delay under different initial conditions.

Keywords: *set-valued differential equations; generalized derivative; delay; existence and uniqueness of solution; numerical algorithm.*

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