



Generalized Monotone Method for Multi-Order 2-Systems of Riemann-Liouville Fractional Differential Equations

Z. Denton^{1*} and J.D. Ramírez²

¹ *Department of Mathematics, North Carolina A&T State University
Greensboro, NC, 27411 USA*

² *Department of Mathematics and Statistics, South Dakota State University
Brookings, SD 57007 USA*

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Abstract: In this paper we develop a generalized monotone method for nonlinear multi-order 2-systems of Riemann-Liouville fractional differential equations. That is, the monotone method where the forcing function f can be decomposed into increasing and decreasing components, and applied to a hybrid system of nonlinear equations of orders q_1 and q_2 where $0 < q_1, q_2 < 1$. In the development of this method we recall any needed existence and comparison results along with any necessary changes; including results from needed linear theory. The monotone method is then developed via the construction of sequences of linear systems based on the upper and lower solutions, being then used to approximate the solution of the original nonlinear multi-order system. Finally we develop a numerical application to exemplify our results.

Keywords: *fractional differential systems; multi-order systems; lower and upper solutions; monotone method.*

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* Corresponding author: <mailto:zdenton@ncat.edu>