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Initial value problem for a coupled system of nonlinear implicit fractional differential equations. (Chinese. English summary) [Zbl 1463.34033]


Summary: By using the fixed point theorem and the Gronwall inequality of vector form, the existence and uniqueness of the solution of the coupled system of nonlinear implicit fractional differential equations under the definition of Caputo fractional derivative are obtained. The estimate on solutions, the continuous dependence on initial values, the continuous dependence on parameters and functions, and $\varepsilon$-approximate solutions for coupled systems are also discussed.

MSC:

34A12 Initial value problems, existence, uniqueness, continuous dependence and continuation of solutions to ordinary differential equations
34A08 Fractional ordinary differential equations
34A09 Implicit ordinary differential equations, differential-algebraic equations
47N20 Applications of operator theory to differential and integral equations
26D10 Inequalities involving derivatives and differential and integral operators

Keywords:

fractional coupled system; implicit differential equation; Caputo’s fractional derivative; fixed point theorem; Gronwall’s inequality