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# REMARKS ON LYAPUNOV FUNCTIONS TO CAPUTO FRACTIONAL NEURAL NETWORKS *

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Dedicated to Professor Mihail Megan
on the occasion of his 70th anniversary

**Abstract**

One of the main properties of solutions of nonlinear Caputo fractional neural networks is stability and usually the direct Lyapunov method is used to study stability properties (usually these Lyapunov functions do not depend on the time variable). In this paper we give a brief overview of the most popular fractional order derivatives of Lyapunov functions and these derivatives are applied to various types of neural networks to illustrate their advantages/disadvantages. We show the quadratic Lyapunov functions and Lyapunov functions which do not depend directly on the time variable and their Caputo fractional derivatives are not applicable in some cases when one studies stability properties. Some suficient conditions using time dependent Lyapunov functions are obtained and illustrated on some particular nonlinear Caputo fractional neural networks.

**MSC**: 34A34, 34A08, 34D20

**keywords:** nonlinear Caputo fractional neural networks, Lyapunov functions, stability, fractional derivative of Lyapunov functions.

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