Stability analysis for discrete–time systems with fractional positive orders

Dorota Mozyrska, Małgorzata Wyrwas

Bialystok University of Technology
Faculty of Computer Science
Wiejska 45A
Białystok, Poland
d.mozyrska@pb.edu.pl, m.wyrwas@pb.edu.pl

The problem of the stability of the Grünwald–Letnikov–type linear discrete-time systems with fractional positive orders is studied. The method of reducing the considered systems by transforming them to the multi-order linear systems with the partial orders from the interval $(0, 1]$ is presented. For the reduced multi-order systems the conditions for the stability are formulated based on the $\mathcal{Z}$-transform as an effective method for stability analysis of linear systems.