

Fractional Calculus in Automatics (elements)

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1. Fractional – order integral and derivative

- 1.1 Grünvald-Letnikov fractional derivative/integral
- 1.2 Riemann-Liouville fractional derivative/integral
- 1.3 Caputo fractional derivative/integral
- 1.4 Properties of fractional derivative/integral
- 1.5 Laplace transform of fractional derivative/integral
- 1.6 Fourier transform of fractional derivative/integral

2. Fractional continuous-time system

- 2.1 Transfer function of a fractional system
- 2.2 State-space description of a fractional system
- 2.3 Response of a fractional system
- 2.4 Stability of a fractional system
- 2.5 Fractional control
 - 2.5.1 CRONE controller
- 2.6 Identification of a fractional system

3. Fractional discrete-time system

- 3.1 Fractional backward difference
 - 3.1.1 Grünvald – Letnikov fractional difference form
 - 3.1.2 Horner fractional difference form
- 3.2 Discrete transfer function
- 3.3 State-space description of a fractional discrete system
- 3.4 Response of a fractional discrete system
- 3.5 Stability of a fractional discrete system
- 3.6 Fractional controller