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Estimating Memory Parameters in Fractional SEIR Dynamics with Power–Mittag-Leffler Laws

Communication Info

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Abstract

Fractional calculus is well suited to represent memory effects in epidemic dynamics [1] and is grounded in established fractional modeling theory [2], [3]. This work proposes a physics-constrained learning approach to estimate fractional parameters in SEIR-type models using Power–Mittag-Leffler kernels, where the extra power parameter ppp provides added control over memory decay [4]. Using a physics-informed setting [5] and a systematic architecture study, the approach achieves accurate reconstruction of nonlocal dynamics and jointly identifies α, β, and p from noisy time series with errors below 13%.

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