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NUMERICAL SIMULATIONS AND ANALYSIS OF MONKEYPOX DISEASE UNDER FRACTIONAL ORDER MATHEMATICAL MODELS

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Abstract. This study explores a fractional-order mathematical model for the dynamics of Monkeypox (Mpox) transmission incorporating Caputo derivatives to capture the influence of memory effects. Building on existing fractional-order mathematical models of Mpox, this study proposes an extended framework that incorporates both human and rodent populations, including exposed and quarantined compartments. This dual-species and compartmental approach enables a more comprehensive analysis of zoonotic transmission and public health interventions. Key parameters include transmission rates, recovery, and mortality factors. Analytical results establish the existence, uniqueness, and boundedness of solutions, ensuring the model's mathematical validity. A generalized Euler method is employed for numerical solutions, demonstrating the impact of fractional orders on disease progression. Simulation results reveal that fractional dynamics significantly influence infection, quarantine, and recovery periods, underscoring the importance of timely interventions.

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