A STUDY ON DISCRETE AND DISCRETE FRACTIONAL PHARMACOKINETICS-PHARMACODYNAMICS MODELS FOR TUMOR GROWTH AND ANTI-CANCER EFFECTS

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We study the discrete and discrete fractional representation of a pharmacokinetics - pharmacodynamics (PK-PD) model describing tumor growth and anti-cancer effects in continuous time considering a time scale $h\mathbb{Z}$, where $h > 0$. Since the measurements of the tumor volume in mice were taken daily, we consider $h = 1$ and obtain the model in discrete time (i.e. daily). We then continue with fractionalizing the discrete nabla operator to obtain the model as a system of nabla fractional difference equations.
For the data fitting purpose, we use a newly developed method which is known as an improved version of the partial sum method to estimate the parameters for discrete and discrete fractional models. Sensitivity analysis is conducted to incorporate uncertainty/noise into the models. We employ both frequentist approach and Bayesian to construct 90 percent confidence intervals for the parameters.