Analyzing the Dynamic Patterns of COVID-19 through Nonstandard Finite Difference Scheme

This paper presents a novel approach to analyzing the dynamics of COVID-19 using nonstandard finite difference (NSFD) schemes. Our model incorporates both asymptomatic and symptomatic infected individuals, allowing for a more comprehensive understanding of the epidemic's spread. We introduce an unconditionally stable NSFD system that eliminates the need for traditional Runge-Kutta methods, ensuring dynamical consistency and numerical accuracy. Through rigorous numerical analysis, we evaluate the performance of different NSFD strategies and validate our analytical findings. Our work demonstrates the benefits of using NSFD schemes for modeling infectious diseases, offering advantages in terms of stability and efficiency. We further illustrate the dynamic behavior of COVID-19 under various conditions using numerical simulations. The results from these simulations demonstrate the effectiveness of the proposed approach in capturing the epidemic's complex dynamics.