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On the Existence of Solutions to a New Hattaf Mixed Fractal–Fractional Model of HIV/AIDS

Communication Info

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Abstract

This work develops a new definition of the Hattaf mixed fractal–fractional derivative , which generalizes multiple types of fractal and fractional derivatives involving both singular and non-singular kernels Unlike traditional derivatives, which often fail to capture anomalous diffusion and multi-scale behaviors, the new formulation allows for a more accurate and adaptable modeling approach across diverse scientific and engineering disciplines, including biological systems, physics, and applied mathematics.
The proposed operator is designed to capture complex dynamical phenomena arising in various applied fields. To demonstrate its applicability, we examine the existence of solutions for an HIV/AIDS transmission model through the framework of Krasnoselskii's fixed point theorem.

References

[1] H. El Mamouni, Z. Hajhouji, K. Hattaf, Existence of solutions for a new class of Hattaf mixed fractal-fractional equations modeling the HIV/AIDS disease. *Adv. Fixed Point Theory*, 12, 2026, 1-16.
[2] K. Hattaf, A new class of generalized fractal and fractal-fractional derivatives with non-singular kernels. Fractal Fract. 7, 2023, 395.
[3] A. Atangana, Fractal-fractional differentiation and integration: Connecting fractal calculus and fractional calculus to predict complex system. Chaos Solitons Fractals 102, 2017, 396-406.
[4] K. Hattaf, A New Mixed Fractional Derivative with Applications in Computational Biology, Computation 12, 2024, 7.
[5] T. A. Burton, A fixed-point theorem of Krasnoselskii. Applied Mathematics Letters 11, 1998, 85-88.