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Spatiotemporal patterns in the Belousov-Zhabotinskii reaction systems with nonsingular kernel derivatives

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(joint work with Kolade Owolabi)

Abstract :

This talk concerns a robust numerical method based on the fractional Adams-Bashforth and the Fourier spectral methods to explore some spatiotemporal patterns in a range of Belousov-Zhabotinskii reaction systems. The standard integer-order time-derivative is replaced with the Atangana-Baleanu fractional order derivative in the sense of Caputo. Details of existence and stability of positive solution are given. Numerical experiments are carried out at some instances of fractional power to demonstrate the suitability of the methods, and to explore the dynamic richness in some chemical species when modelled with non-integer-order derivatives.

Keywords : Fourier spectral method ; Existence of solution ; Fractional reaction-diffusion ; Spatiotemporal oscillations ; Stability analysis.

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