

TIME-FRACTIONAL 2D DIFFUSION WITH FIXED MEMORY LENGTH – SOLUTIONS AND DIFFUSION SPEED ANALYSIS

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We shall discuss the diffusion problem on a rectangle – 2D interval on a plane. The time-fractional derivative is given as a fractional derivative with fixed memory length [1]. Contrary to the standard time-fractional models, where full memory derivative is included we assume that the model is characterized by an additional parameter – the memory length. Exact solutions are derived in the form of Fourier series, both in the version of weak solution as well as in the version of strong solution. These results generalize the previously discussed exact and approximate solutions for 1D time- and space-fractional diffusion problems [2,3]. The time evolution of the solution is studied and compared to the classical diffusion as well as to the time-fractional diffusion with full memory length.

References

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