

SEMINAR

Grupo de Análise Funcional e Aplicações Functional Analysis and Applications Group

On the fundamental solution of the ψ -Hilfer fractional diffusion equation and its probabilistic interpretations

Nelson Vieira
CIDMA - Universidade de Aveiro

Abstract

In this talk, we consider the multidimensional time-fractional diffusion equation where the time-fractional derivative is the ψ -Hilfer derivative of order $\alpha \in]0, 1]$, type $\mu \in [0, 1]$, and where ψ is a positive monotone increasing function with continuous derivative. By employing the techniques of the Fourier, ψ -Laplace, and Mellin transforms, we obtain a representation of the solution of the Cauchy problem associated with the equation in terms of convolutions involving Fox H-functions. Fractional moments of arbitrary order $\gamma > 0$ are also computed. Series representations of the first fundamental solution are explicitly obtained for any dimension. For the one-dimensional case, we show that the series representation reduces to a Wright function and we prove that it corresponds to a probability density function. Finally, some plots of the fundamental solution are presented for particular choices of the function ψ and the fractional parameters.

This is a joint work with M. Ferreira (IPLeia & CIDMA) and M.M. Rodrigues (UA - CIDMA).

Room 11.2.21
May 5, 2022 - 11:00

This seminar is supported in part by the Portuguese Foundation for Science and Technology (FCT - Fundação para a Ciência e a Tecnologia), through CIDMA - Center for Research and Development in Mathematics and Applications, within project UIDB/04106/2020.