

# An Approach to Solutions of Fractal and Fractional Time Derivative Fokker-Planck Equation

Hamdy Abdel-Gawad<sup>1</sup>

<sup>1</sup>Cairo University

May 5, 2020

## Abstract

Abstract An approach to find the exact solution of ordinary, fractal and fractional Fokker-Planck equation FPE, based on transforming it to a system of first-order PDEs, together with using the extended unified method, is presented. Reduction of the fractal and fractional derivatives to the classical on's with time-dependent coefficient is performed via similarity transformations. Some explicit solutions of the classical, fractal and fractional time derivative FPE, are obtained . It is shown that the solution of the FPE is mixed Gaussian's. It is worthy to mention that the mixture of Gaussians is a powerful tool in machine learning. Further,it is found that the friction coefficient plays a significant role in lowering the magnitude of the distribution function. While changing the order of the fractal and fraction time derivative has a slight effects and the mean and mean square of the velocity vary slowly.

## Hosted file

Fokker. last. lyx.pdf available at <https://authorea.com/users/301074/articles/430853-an-approach-to-solutions-of-fractal-and-fractional-time-derivative-fokker-planck-equation>



