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The Fractional Diffusion Equation and a New Distribution with Heavy Tails

In the classical diffusion process, particles in a physical system spread according to the Gaussian process. Using fractional derivative on the partial differential equation, the solution turns out to be non Gaussian and we demonstrated that the invariance solution is a particular form of Wright function. We refer to the density function as the Wright distribution. It can also be thought of as a convolution of two random variables having inverse Gaussian and gamma distributions. The Wright distribution has heavy tails with other suitable properties to model financial data. We studied some properties and developed an estimation procedure.