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The g-subdiffusion equation as a universal anomalous diffusion equation

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The g-subdiffusion equation is a subdiffusion equation containing the fractional Caputo time derivative with respect to another function g. The process described by this equation is interpreted as "ordinary" subdiffusion in which the time variable t has been replaced by an increasing function g(t). This function determines the frequency of jumps of the diffusing molecule. The g-subdiffusion equation can be derived from a modified continuous time random walk model. By defining the function g appropriately, this equation describes a smooth transition from subdiffusion to superdiffusion, to subdiffusion with changing parameters, and to slow subdiffusion (ultraslow diffusion). This equation can also describe superdiffusion (then we call it the g-superdiffusion equation), providing solutions that in the long-time limit are consistent with solutions of the fractional superdiffusion equation with the spatial fractional Riesz-Weyl type derivative. For the g-superdiffusion equation, the problem of assuming local boundary conditions at partially permeable thin membranes does not arise.
References.
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