

In this talk I discuss a non-uniform (adaptive) grid approximation for one-dimensional space-fractional PDEs.

It is based on a so-called L2-method for fractional derivatives with order  $\alpha$  between 1 and 2. I will also introduce basic ideas of fractional calculus and the fractional Laplacian with  $\alpha$  between 0 and 2.

Special attention is needed for the case  $\alpha=1$ : then the Hilbert transform comes into play. Numerical experiments illustrate the different effects and show the relation and the differences with traditional PDE models, such as the advection equation and the heat equation.