

LDE Quantum Algorithm Note

Euan Mendoza

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1 Linear Differential Equations (LDE)

Recall that a differential equation that is written in terms of it's derivative. For example Schrodinger's equation is a differential equation,

$$i\hbar \frac{\partial}{\partial t} |\Psi(t)\rangle = \hat{H} |\Psi(t)\rangle \quad (1)$$

A linear differential equation (LDE) is an equation where each derivative

$$c_0 f(x) + c_1 \frac{df(x)}{dx} + c_2 \frac{df^2(x)}{dx^2} \cdots c_{k-1} \frac{df^{k-1}(x)}{dx^{k-1}} + c_k = 0 \quad (2)$$

Solving LDE's is incredibly important in material science, physics and economics.