Machine Learning and Non Linear Schrodinger Equations

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I. GROSS-PITAEVSKII EQUATION

To solve GPE equation numerically, we are going to use a framework called as XMDS

Dimensionless 1-D GPE can be written as,

$$\frac{\partial \phi}{\partial \xi} = \frac{i}{2}\frac{\partial^2 \phi}{\partial \tau^2} - \Gamma(\tau)\phi + i|\phi|^2\ \phi$$

The coefficient of the non-linear term determines the interaction type. If there is no interaction $g = 0$ and equation reduces the Schrodinger Equation. For repulsive interactions $g > 0$, and $g < 0$ for attractive.