Project proposal for **Numerical Methods** course.

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1 Title

Solution of Diffusion Equation.

1.1 Plan

I wish to begin with heat flow in a metal rod in one dimension $\partial u/\partial t = constant(\partial^2 u/\partial x^2)$, computing the distribution of temperature in the rod, varying parameters like time step.

Next I would try to solve second order diffusion equation:

$$\frac{\partial u}{\partial t} = constant(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}) \tag{1}$$

1.2 Numerical Methods to be used

Solution may be obtained by **Finite Difference** method – *Leap Frog*, *Crank-Nicholson* or *Alternating Direction Implicit* method, bringing the equation (1) in tridiagonal form thus reducing the order of operation. Comparison may be done between various methods and stability of solutions may also be observed.