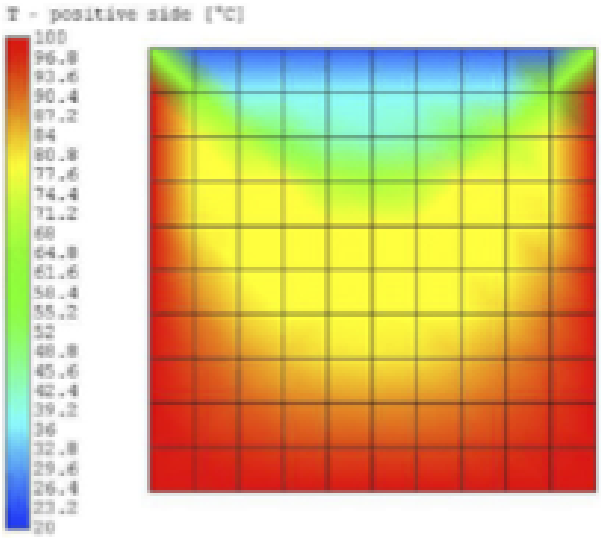
MSCS Undergraduate Research Laboratory

Fall 2021 Undergraduate Research Opportunity

Numerical methods for the Heat Equation in 2D



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Laplace's equation

$$\Delta u = 0 \quad \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0 \right)$$

arises in the study of steady state or time independent solutions to the two-dimensional heat transfer equation, where u represents temperature. In this project, a numerical technique is implemented on Laplace's equation to study the heat transfer on a rectangular plate when its walls are subject to constant temperatures (Dirichlet Boundary Conditions). The numerical scheme replaces partial differential equations with a linear system of equations to approximate the temperature distribution throughout the plate given the boundary conditions.

Prerequisites: Math 210, Math 220, and programming experience.

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