

Investigating Fourier’s Heat Equation

$$\frac{\partial u}{\partial t} - \alpha \nabla^2 u = 0$$

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1 Introduction

The heat equation is used to describe the distribution of heat in an object over time. While not introduced by Fourier, it is a method for solving the equation proposed by Fourier in his *Théorie analytique de la chaleur*—translated as “an analytical theory of heat”—that we will be investigating. I chose to investigate Fourier’s solution to the heat equation because it is through his solution that the Fourier Transform, a popular tool in signal processing, was defined. I frequently use the Fourier Transform while doing data analysis, and I wanted to learn how and why it was created.

2 Proof

2.1 Visual Proof