This fall I was reading a wonderful book, Stanley J. Farlow's *Partial Differential Equations for Scientists and Engineers*. I'd originally bought it on a recommendation from one of my friends, and as soon as I got the book I was fascinated by the secrets it contained.

I started reading Farlow from the beginning. I tried to do the example problems without looking at Farlow's work, and once I had found something I checked to see what was different, and over time I began to notice a few patterns. I found that there were many small errors, but I found that as I developed an intuition for how partial differential equations are solved, I noticed the errors before I referred to Farlow's work. When I looked at what the equations told me, my newfound intuition would kick in, and I would feel insight or confusion. At first, I was often confident in mistakes, but I noticed as I worked through more of the chapters that I was starting to see what made sense and what didn't.

Farlow started with the heat equation in the simplest case of a finite rod with the temperature at the ends fixed at zero, and then added things on to this simple example. I followed him as he added a description of how the rod behaves when the ends are fixed at different temperatures from each other. I followed him as he introduced me to fourier series, and then general eigenfunction methods for solving nonhomogenous problems. Then, the finite rod became an infinite rod, and I learned the elegant solution by Fourier transform. Every step was small. I never felt like I was too lost, I never felt like we were taking too big a leap, but I never felt bored either. Farlow was where I got my problem-solving and learning fixes as semester slowly started.

I was taking Waves and Thermal Physics that semester, and we started out by investigating a finite string. I knew what to do. Just like with Farlow, I tried to keep my derivation ahead of the class's, and then compare later to see where I was off. The techniques that I had used to solve the heat problem applied perfectly to solving the wave problem. I was expecting the class to continue to extend the wave equation to new situations the way that Farlow and I extended the heat equation. But as soon as we finished talking about the finite string, we stopped. We discussed what would happen to an infinite string if it started out still, but nobody ever mentioned how we could possibly predict the string's behavior if it was moving.

The class moved on, so I decided that I would do it myself. Very quickly, using Farlow's fourier transformation method, I got the class's solution for the infinite string, starting stationary. I was ecstatic, and I thought that I would have the whole problem soon. But I hit a wall: a terrifyingly complicated integral (representing an inverse fourier transforn) which I had no idea how to evaluate. I shelved the problem after a few hours of useless bashing, and turned my attentions to other homework.

During a study party a few days afterwards, people were talking about problems which they'd been playing with, and I mentioned the partial solution to the infinite-length string, and told everybody that I'd been stuck on it, and didn't know where to go. The person who originally recommended Farlow's book then looked at my work, and pointed at the integral. He said that it had confused him when he did it, and recommended that I try to take the fourier transform of a simple function which is one within a certain range, and zero everywhere else. Lo and behold, there it was. I now knew what waves on infinte strings do, I have a complete description of the behavior. I was thrilled.