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Project of Mathematics Modeling

TOPIC TERMS

PDE, Heat conduction equation, Fourier’s law, Complex function.

TOPIC SENTENCE

Our project focus on solving the one-dimensional model of detecting the land mines using heat conduction equation.

PAPER SUMMARY

Our project is an application of the heat conduction equation. It is helpful for the countries that suffered from landmines after the wars, and it is possible to detect landmines easily and efficiently by using our model. We hope this application can conduct the dangerous of demine.

This topic of this project is how to solve the heat conduction equations. Barnes gives us ideas that solving heat conduction equation uses the Fourier’s law and method of separation of variables. (Barnes 2014) Our plan is using these methods to make a model to deal and analyze data.

In our plan, we should solve the equations thoroughly and produce a program where we can type in some whether and soil information then it generates a graph of normalized temperature of soil surface versus time in days. After the basic thing is done, we may go to higher dimension or exam different conditions. The questions and difficulties list at the end of the document.

We choose the topic because it really cares about people’s lives, which means a lot for us. China and USA, two countries that we used to or now living in do does not participate in banning the land mines. Maybe the research we arise our awareness of the harm of the land mines. As for the problem itself, we have a clear path on what we should do and possibly we can dig deeper (hopefully there’s no land mines).

QUESTIONS

The problem seems so well established that it has clear all the path for us in the book. It looks like that we just need to understand and rewrite the topic in our own words. Is it possible that we go to higher dimension? Or maybe the assumption like the parameters can be more complicated like it is a function instead of a constant.

One of our goals is building a program in Matlab on which we can type in some conditions like the temperature then it can generate a graph Like Figure 12.3 in the book. Is it possible to do it in Matlab and convert it to .exe file?

From schedule, we will touch PDE in class at time close to the deadline of our project. It seems like that we should learn it by ourselves. Then, we may need professor help us to learn this part and recommend some related books.

We look up that there are lots of parameters in the function, and some parameters like the specific heat are easy to find, but the other parameters like density of soil in specific countries are difficult to find. How to find these parameters also be a challenge for our project.

Work Cited

Barnes, G. (2014). *Mathematical Modelling with Case Studies: Using Maple and MATLAB.* CRC Press.