

# Topics in differential equations

## Fall 2018

Office hours: Mon/Wed, 10:30-11:30; Fri 9:30-10:30. Please try to come during the first 15 minutes of the office hour. I may leave early if nobody shows up in the first 15 minutes.

- [Introduction: persistence of vegetation patterns in near-desert conditions](#)
  - [Related FlexPDE script](#)
- [Notes on Turing bifurcation](#)
- [Multiple scales example](#)
- [Using multiple scales to get a Complex Ginzburg Landau PDE from a PDE with a delay](#). See also:
  - - Matlab code to numerically an ODE with delay: [simplifiedde.m](#)
- [MEMS model](#)
- [Subsolution/supersolution/max principle](#) See also:
  - [Maple worksheet for MEMS bifurcation diagram](#)
- [Mathematical model of crime](#)
- [Galante-Wisen-Bhaya-Levy model of bacterial aggregation](#)
  - [Accompanying movies](#)
  - [Related paper](#)
  - [Matlab code](#)
- [Mean first passage time for small traps](#)
- [Rapidly convergent series for the regular part of modified Green's function on a rectangle: resummation.](#)
- [Metastability: exponentially slow motion of interfaces in 1D Allen-Cahn model](#)
  - See the FlexPDE script [front1d-two.pde](#)
- [Travelling waves in thin domains](#)
- [Spike patterns in GM system 1: Stability of K spikes, large and small eigenvalues](#)
- [Dynamics of a single interior spike in the GM system](#)
- [\(for reference only\) Wei's proof of stability of NLEP problem](#)
- [FlexPDE script: two boundary spikes in GM model](#)
- [FlexPDE script: Dynamics of a single interior spike.](#)

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Evaluation: 75% homework and 25% term project. There is no final.

Term project:

For term project, you will be required to read a mutually agreed upon research paper, give an in-class presentation on it, and submit a report. More information will be given during the class.

## Homework sets

- [Homework 1, due Wed, Sep 19 | Solutions](#)

Other links:

- [My notes on various topics](#)
- [See also notes from last time class was offered \(2014\)](#)
- [PPlane software](#)