Analysis Seminar

Title: Steady States of the Gierer-Meinhardt System in Exterior Domains

Speaker: Jack McNicholl

Date: Tue 14th October 2025 at 3:00PM

Location: E0.32 (beside Pi restaurant)

Abstract: In 1952, Alan Turing proposed a chemical and mathematical mechanism for 'morphogenesis', one of the biochemical processes behind cell-formation. Based on that work, Alfred Gierer Hans Meinhardt devised the first so-called 'Gierer-Meinhardt system' of partial differential equations to model this phenomenon.

In this talk we obtain results for existence and non-existence of positive solutions (which describe chemical concentrations throughout a medium) of one kind of this system. This is done on a so-called 'exterior domain' (all of real space barring a compact set), in contrast to previous work on bounded domains or the entire space.

We show how this can be done through obtaining and then manipulating asympotic behaviours of Laplacians, using comparison lemmas, sub/super-solution methods, and fixed point techniques.

(Based on joint work with Marius Ghergu)

https://ucd-ie.zoom.us/j/68930625320

https://ucd-ie.zoom.us/j/68930625320