



## Applied and Computational Mathematics Seminar

**Title:** Twixt firelight and water: The flame equation with relations to Navier-Stokes

**Speaker:** Prof. Adam Larios (University of Nebraska-Lincoln)

**Date:** Thu 26th May 2022 at 3:00PM

**Location:** Seminar Room SCN 1.25

**Abstract:** The flame equation, also known as the Kuramoto-Sivashinsky equation (KSE) is a highly chaotic dynamical system that arises in flame fronts, plasmas, crystal growth, and many other phenomena. Due to its lack of a maximum principle, the KSE is often studied as an analogue to the 3D Navier-Stokes equations (NSE) of fluids. We will discuss some of the relationships between these equations of fire and water. Much progress has been made on the 1D KSE since roughly 1984, but for the 2D KSE, even global well-posedness remains a major open question. In analogy with regularizations of the 3D NSE, we present modifications of the 2D KSE which allow for global well-posedness, while still retaining many important features of the 2D KSE. However, as has been demonstrated recently by Kostianko, Titi, and Zelik, standard regularizations, which work well for Navier-Stokes, destabilize the system when applied to even the 1D KSE. Thus, we present entirely new types of modifications for the 2D KSE. This talk will describe key ideas of the analysis, and also show many colorful movies of solutions.

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