Séminaire EDP de l'ERC ReaDi

Equations de réaction-diffusion, propagation et modélisation

Henri Berestycki

Les membres de l'ERC ReaDi sont heureux d'annoncer le lancement d'un cycle de séminaires autour des Equations aux Dérivées Partielles qui se tiendront un mercredi sur deux à l'Ecole des Hautes Etudes en Sciences Sociales à commencer du mercredi 11 Février. Retrouvez toutes les informations sur le séminaire : http://readi-project.weebly.com/pde-seminar.html.

Troisième séance : **mercredi 25 février à 11h**

Salle 466, EHESS, 190-198 avenue de France, 75013 - Paris

Kevin Zumbrun, *Indiana University*

Title: **Modulation of spatially periodic patterns and behavior of thin film flows**

Abstract: Periodic patterns and traveling waves arise quite generally in optics, biology, chemistry, and many other applications. A great success story over the past couple decades for the dynamical systems approach to PDE has been the rigorous treatment of modulation of periodic patterns in reaction diffusion systems. However, the techniques used were designed for modulations with a single degree of freedom. For systems possessing one or more conservation laws, hence two or more degrees of freedom in particular, the Kuramoto-Sivashinsky, Saint Venant, and other equations governing thin film flow- these methods do not apply. Here, we present an approach applying also to this more general situation, rigorously verifying an associated "Whitham system" formally governing slow modulations under suitable numerically verifiable stability assumptions on the spectra of the linearized operator about the background pattern. This verifies/explains a number of numerically observed phenomena in thin film flow, including 'viscoelastic behavior" in cellular Kuramoto-Sivashinsky behavior, and the "homoclinic paradox" in inclined thin-film flow, the latter concerning the puzzling phenomenon that asymptotic behavior appears to consist of solitary waves, despite that solitary waves are readily seen to be exponentially unstable. We conclude by discussing verification of our spectral assumptions in weakly and strongly unstable (corresponding to small and large Froude number) regimes, giving simple power-law formulae describing the stability boundaries in each case. The latter, strongly unstable description, relevant in applications to hydraulic engineering/dam spillway construction, was unexpected and to our knowledge is completely new.

Organisateurs : Jian Fang, Grégory Faye, Andrea Tellini et Alessandro Zilio

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