Séminaires EDP de l'ERC ReaDi

Equations de réaction-diffusion, propogation et modélisation

Henri Berestycki

Les membres du projet ERC ReaDi sont heureux d'annoncer le lancement de la deuxième saison du cycle de séminaires autour des Equations aux Dérivées Partielles qui se tiendront à l'Ecole des Hautes Etudes en Sciences Sociales à commencer du 26 Janvier.

Retrouvez toutes les informations sur le séminaire : http://readi-project.weebly.com/pde-seminar.html (Attention : certaines dates ont été modifiées).

Onzième séance : **jeudi 14 avril à 11h00**
Salle 466, EHESS, 190-198 avenue de France, 75013 - Paris

Danielle Hilhorst, *Laboratoire d'Analyse Numérique, Université Paris-Sud 11*

Titre : **Mathematical analysis of a three component chemotactic system**

Résumé : We consider an initial-boundary value problem describing the formation of colony patterns of bacteria *Escherichia coli*. This model consists of reaction-diffusion equations coupled with the Keller-Segel system from the chemotaxis theory in the space-time domain $\Omega \times (0,\infty)$, where Ω is a bounded domain of $\mathbb{R}^d$ with a sufficiently smooth boundary $\partial\Omega$. More precisely, we study the problem

$$\begin{cases} u_t = \Delta u - \nabla \cdot (u \nabla \chi(c)) + g(u)nu - b(n)u & \text{in } \Omega \times (0,\infty), \\ c_t = d_c \Delta c + \alpha u - \beta c & \text{in } \Omega \times (0,\infty), \\ n_t = d_n \Delta n - \gamma g(u) nu & \text{in } \Omega \times (0,\infty), \\ w_t = b(n)u & \text{in } \Omega \times (0,\infty). \end{cases}$$

We supplement these equations with the Neumann boundary conditions

$$\frac{\partial u}{\partial \nu} = \frac{\partial c}{\partial \nu} = \frac{\partial n}{\partial \nu} = 0 \qquad \text{for} \quad x \in \partial\Omega \quad \text{and} \quad t > 0$$

as well as with nonnegative initial data

$$u(x,0) = u_0(x),\ c(x,0) = c_0(x),\ n(x,0) = n_0(x),\ w(x,0) = w_0(x) \quad \text{for} \quad x \in \Omega.$$

Here $u(x,t)$ denotes the density of active bacteria, $w(x,t)$ the density of inactive bacteria, $n(x,t)$ the density of nutrient and $c(x,t)$ the concentration of chemoattractant. We remark that the first three equations are closed for u, c and n and that if these are solved, then w can be obtained from u and n. We answer questions about the global in time existence of solutions as well as on their large time behavior. Moreover, we show that the solutions of a related model may blow up in finite time.

Work in collaboration with Rafał Celiński, Grzegorz Karch and Masayasu Mimura.

Organisateurs : Andrea Tellini et Alessandro Zilio

European Research Council
Established by the European Commission

cams

L'ECOLE DES HAUTES ETUDES EN SCIENCES SOCIALES