



Mês de: **OUTUBRO 2012**

SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

Dia 31 de Outubro (quarta-feira), às 14h45, na Sala A2-25

On a Mathematical Analysis for A Class of Hyperbolic - Parabolic Problems

L. Lévi

(Pau University, Laboratory of Applied Mathematics, France)

Abstract:

Based on the works in [1, 2, 3], this talk deals with the well-posedness for the coupling of multidimensional quasilinear diffusion-transport equations. Namely, let Ω be a bounded domain Ω of \mathbb{R}^n , $n \geq 1$, such that $\bar{\Omega} = \bar{\Omega}_h \cup \bar{\Omega}_p$; Ω_h and Ω_p being two disjoint bounded domains with Lipschitz boundaries respectively Γ_h and Γ_p . We are interested in the existence and uniqueness for the boundaries values problem :

For any $T > 0$, find a measurable and bounded function u on $Q = (0, T) \times \Omega$ such as

$$\begin{cases} \partial_t u + \operatorname{div}_x(f_p(u)\nabla P(x)) + g_p(t, x, u) = \Delta\phi(u) & \text{in } Q_p = (0, T) \times \Omega_p, \\ \partial_t u + \operatorname{div}_x(f_h(u)\nabla P(x)) + g_h(t, x, u) = 0 & \text{in } Q_h = (0, T) \times \Omega_h, \\ u = 0 & \text{on } \Sigma \equiv (0, T) \times \partial\Omega, \\ u(0, \cdot) = u_0 & \text{on } \Omega, \end{cases}$$

subject to the transmission conditions along the interface $\Gamma_{hp} = \Gamma_h \cap \Gamma_p$:

$$(f_p(u)\nabla P - f_h(u)\nabla P) \cdot \nu_h = \nabla\phi(u) \cdot \nu_h \text{ on } \Sigma_{hp} \equiv (0, T) \times \Gamma_{hp}.$$

We first provide the definition of a *weak entropy solution*. For the uniqueness two situations are investigated and whether the characteristics of the first order operator set on Ω_h are entering or outgoing along the interface. The existence result is obtained through a vanishing viscosity method on the hyperbolic zone.

Références

- [1] G.Aguilar, L.Lévi and M.Madaune-Tort, Coupling of Multidimensional Parabolic and Hyperbolic Equations. *J. Hyperbolic. Differ. Equ.* **3**, 1 (2006) 53-80.
- [2] G.Aguilar, L.Lévi and M.Madaune-Tort, Nonlinear Multidimensional Parabolic-Hyperbolic Equations. 2006 International Conference in honor of Jacqueline Fleckinger. *Electron. J. Diff. Eqns.* Conference 16 (2007), pp. 15-28.
- [3] J.Jimenez and L.Lévi, A Mathematical Analysis for some Class of Hyperbolic-Parabolic Problems. *Advances in Mathematical Sciences and Applications* (2010)

Local:
**Instituto para a Investigação Interdisciplinar
da Universidade de Lisboa**
Av. Prof. Gama Pinto, 2
1649-003 Lisboa

