ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

B. Buffoni – B. Dacorogna – J. Krieger - H.M Nguyên - Section Mathématiques

SEMINAIRE D'ANALYSE

- ***VENDREDI 09 MARS 2018 à* 14h15 - *salle MA A1 12***

Professeur ***PAOLO MARCELLINI*** *(*University of Firenze, Italie) donnera une conférence sur le thème:

Elliptic and parabolic equations under general and p, q growth conditions

We give some recent *existence* and *interior regularity results* - partly obtained in collaboration with *Giovanni Cupini, Michela Eleuteri* and *Elvira Mascolo* - for elliptic partial differential *equations* in divergence form, or elliptic *systems* of m partial differential equations in divergence form of the type

$$\sum_{i=1}^{n} \frac{\partial}{\partial x_i} a_\alpha^i \left(x, u\left(x\right), Du\left(x\right)\right) = b_\alpha \left(x, u\left(x\right), Du\left(x\right)\right), \quad \alpha = 1, 2, \ldots, m,$$

for maps $u : \Omega \subset \mathbb{R}^n \to \mathbb{R}^m$. Here the vector field $\left(a_\alpha^i\left(x, s, \xi\right)\right)$ assumes values in the set of $m \times n$ matrices and it satisfies some *general growth conditions* with respect to the gradient variable $\xi \in \mathbb{R}^{m \times n}$, sometine *$p, q$ growth conditions.*

As a part of a joint research-project with *Verena Bögelein and Frank Duzaar*, we consider the evolution problem associated with a convex integrand $f : \mathbb{R}^{m\times n} \to [0, \infty)$ satisfying - for instance - some p, q-growth assumption. To establish the existence of solutions we introduce the concept of *variational solutions*. In contrast to weak solutions, i.e. mappings $u : \Omega_T \subset \mathbb{R}^{n+1} \to \mathbb{R}^m$ which solve

$$\partial_t u - \operatorname{div} Df(Du) = 0$$

weakly in Ω_T, variational solutions in general exist under a much weaker assumption on the gap $q - p$.

admits the necessary higher integrability of the spatial derivative Du to satisfy the parabolic system in the weak sense, i.e. we prove that

$$u \in L^q_{\mathrm{loc}}\left(0, T; W^{1,q}_{\mathrm{loc}}(\Omega, \mathbb{R}^m)\right).$$

Lausanne, le 16 janvier 2018
BD/vl

Les séminaires d'Analyse sont annoncés sur le site caa.epfl.ch et sur http://memento.epfl.ch/maths/