On the existence of boundary blow-up solutions for a general class of quasilinear elliptic systems

Sonia Ben Othman[1], **Rym Chemmam**[1], <u>**Paul Sauvy**</u>[2]

SUMMARY

In this talk, we present some recent results extracted from [1] concerning quasilinear elliptic systems (P) with explosive boundary conditions shaped as follows :

$$(\text{P})\begin{cases} \Delta_p u = f_1(x,u,v) & \text{in } \Omega\,; \quad u|_{\partial\Omega} = +\infty, \quad u > 0 \quad \text{in } \Omega, \\ \Delta_q v = f_2(x,u,v) & \text{in } \Omega\,; \quad v|_{\partial\Omega} = +\infty, \quad v > 0 \quad \text{in } \Omega. \end{cases}$$

In this problem,

  - Ω is a smooth bounded domain of $\mathbb{R}^N$ with $N \geq 2$,

  - $\Delta_r w \overset{\text{def}}{=} \text{div}\left(|\nabla w|^{r-2}\nabla w\right)$ denotes the r-Laplacian with $1 < r < +\infty$,

  - f_1 and f_2 are two Carathéodory functions in $\Omega \times (\mathbb{R}_+^* \times \mathbb{R}_+^*)$.

Then, under rather general conditions on f_1 and f_2 and assuming the existence of a sub and supersolutions pair, we first prove the existence of a large solution to (P) by a fixed point approach. In a second step, we apply this result considering particular systems arising in Biology.

Keywords: Quasilinear elliptic systems, boundary blow-up solutions, existence, boundary behavior, sub and supersolutions method, Schauder's fixed point theorem, Karamata regular variation theory.

AMS Classification: 35B40, 35B44, 35J56, 35J92.

References

[1] S. Ben Othman, R. Chemmam, P. Sauvy. On the existence of boundary blow-up solutions for a general class of quasilinear elliptic systems. *To appear in Advanced Nonlinear Studies*, 2014.

[1]Département de Mathématiques
 Faculté des Sciences de Tunis,
 Campus universitaire, 2092 Tunis (TUNISIA)
 `Sonia.Benothman@fsb.rnu.tn`, `Rym.Chemmam@fst.rnu.tn`

[2]Institut Mathématique de Toulouse - CeReMath
 Université Toulouse 1 - Capitole,
 Manufacture des Tabacs,
 21 Allée de Brienne, 31000 Toulouse (FRANCE)
 `paul.sauvy@ut-capitole.fr`