

A mathematical study for a quasilinear model of size-structured populations

O.Arino¹, S. Boulite², Hammadi Bouslous³ and My Lhassan Hbid⁴.

In this work, we study the existence and some regularity properties of the solution of the following quasilinear size-structured model with competition effect between individuals of different sizes

$$\begin{cases} \frac{\partial u}{\partial t}(s, t) + \frac{\partial}{\partial s}([f_0(s) + \int_0^s L(s, v)u(v, t)dv]u(s, t)) = -\mu(s)u(s, t), & t \geq t_1, s \geq 0, \\ u(0, t) = \int_0^{+\infty} \beta(s)u(s, t)ds, & t \geq t_1, \\ u(\cdot, t_1) = \varphi. \end{cases}$$

$u(s, t)$ represents the density of population with size s at time t , we include here population with several species. $\mu(\cdot)$ and $\beta(\cdot)$ are respectively the mortality and the fertility rates. $f_0(s)$ is the minimal growth of the biomass of the population with size s and $L(\cdot, \cdot)$ represents the kernel of intra and inter-specific competition.

References

- [1] O.Arino, Chr. Mullon, Y. Shin and Ph. Cury. Etude mathématique d'un modèle de croissance de la biomasse sous l'hypothèse de prédation des moins gros par les plus gros. Preprint.

¹Institut de Recherche pour le Développement (IRD), 32 avenue Henri Varagnat, F-93143 Bondy, France (e-mail: ovide.arino@bondy.ird.fr).

²Faculté des Sciences Semlalia Département de Mathématiques, BP 2390, Marrakesh, Morocco (e-mail: sboulite@ucam.ac.ma).

³Faculté des Sciences Semlalia Département de Mathématiques, BP 2390, Marrakesh, Morocco (e-mail: bouslous@ucam.ac.ma).

⁴Faculté des Sciences Semlalia Département de Mathématiques, BP 2390, Marrakesh, Morocco (e-mail: hbid@ucam.ac.ma).