ASYMPTOTIC BEHAVIOR AT THE BOUNDARY OF SOLUTIONS OF REACTION-DIFFUSION EQUATIONS WITH NONLINEAR BOUNDARY CONDITIONS

JOSÉ M. ARRIETA

We consider a reaction diffusion equation with nonlinear boundary condition of the type

$$\begin{cases} u_t - \Delta u = f(x,u), & \Omega \\ \frac{\partial u}{\partial n} = g(x,u), & \partial\Omega \end{cases}$$

in a bounded smooth domain Ω. We assume that the nonlinearity f is dissipative (for instance $f(x,u) = -\beta(x)u^p$, with $\beta(x) \geq 0$) while g is explosive ($g(x,u) = u^q$) and analyze how this two mechanisms compete. We find appropriate balances between f and g that will show that the solution starting at any smooth initial condition u_0 is bounded for all time. We will show, see [1], that if these balances hold locally around certain point in the boundary, the solution is globally bounded around this point of the boundary. This result complements another one obtained in [2] in which we showed that if the balances between f and g are the opposite then blow-up occurs at that point of the boundary.

References

[1] J.M. Arrieta, "On boundedness of solutions of reaction-diffusion equations with nonlinear boundary conditions," *Preprint.* (2005)

[2] J.M. Arrieta, A. Rodríguez-Bernal "Localization on the boundaryof blow-up for solutions of reaction-diffusion equations with nonlinear boundary conditions," *Comm. in PDE's* 29, 1127-1148 (2004)

(José M. Arrieta) Departamento de Matemática Aplicada, Universidad Complutense de Madrid, 28040 Madrid, Spain

E-mail address: arrieta@mat.ucm.es