

# On a state constraints problem with no control on the dynamical system

Gregorio Díaz <sup>1</sup>

We study a probabilistic representation of the classical large solution of

$$\mathcal{L}u + a_0u + g(u) = f \quad \text{in } \Omega$$

as a value function arising in a Stochastic Optimal Control, provided that  $\mathcal{L}$  is an elliptic second order partial differential operator and  $a_0$  and  $f$  are nonnegative continuous functions in a bounded open set  $\Omega$  of  $\mathbb{R}^N$ ,  $N > 1$ , with  $\partial\Omega \in \mathcal{C}^2$ . Moreover,  $g$  is a nonnegative continuous function with  $g(0) = 0$  satisfying the Keller–Osseman condition. The explosive expansion near the boundary of  $u$  as well as others topics of the control theory are obtained. So, we prove that, in fact,  $u$  solves a kind of state constraints problem with no control on the relative dynamical system involved to  $\mathcal{L}$ . We note that others points of view by means of superdiffusion, mainly when  $\mathcal{L} = -\Delta$ ,  $a_0 = f \equiv 0$  and  $g(r) = r^m$ ,  $1 < m \leq 2$ , are known.

---

<sup>1</sup>Universidad Complutense de Madrid, Madrid (Spain)  
e-mail: [gdiaz@ucm.es](mailto:gdiaz@ucm.es)