

**SEMILINEAR PARABOLIC EQUATIONS WITH
SUPERLINEAR REACTION TERMS, AND APPLICATION
TO SOME CONVECTION-DIFFUSION PROBLEMS**

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ABSTRACT.

We are interested in the existence of distributional solutions for two kinds of nonlinear evolution problems, whose models are

$$\begin{cases} v_t - \Delta v = f(x, t) (1 + |v| |\log |v||^\alpha) & \text{in } \Omega \times]0, T[; \\ v(x, t) = 0 & \text{on } \partial\Omega \times]0, T[; \\ v(x, 0) = v_0(x) & \text{in } \Omega \end{cases} \quad (1.1)$$

and

$$\begin{cases} u_t - \Delta u = \beta(u)|\nabla u|^2 + g(x, t) & \text{in } \Omega \times]0, T[; \\ u(x, t) = 0 & \text{on } \partial\Omega \times]0, T[; \\ u(x, 0) = u_0(x) & \text{in } \Omega. \end{cases} \quad (1.2)$$

In the first one the nonlinear reaction term depends on the solution with a slightly superlinear growth. In the second one we consider a first order term depending also on the gradient of the solution in a quadratic way.

The two problems are strictly related from the point of view of the *a priori* estimates we can obtain on their solutions. We point out that no boundedness is assumed on the data of the problems. This implies that the methods involving sub/super-solutions do not apply, and we have to use some convenient test-function to prove the *a priori* estimates.

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Key words and phrases. Nonlinear parabolic problems, convection-diffusion problems, superlinear reaction term, gradient term with quadratic growth, existence, a priori estimates.