Wave Equations with $p(x,t)-$ Laplacian and Damping Term : Existence and Blow-up

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Let $\Omega \subset \mathbb{R}^n$ be a bounded domain with Lipschitz-continuous boundary Γ and $Q_T = \Omega \times (0,T]$. We consider the Dirichlet problem

$$u_{tt} = div\left(a(x,t)\,|\nabla u|^{p(x,t)-2}\,\nabla u\right) + \alpha \triangle u_t + b(x,t)|u|^{\sigma(x,t)-2}u, \quad (x,t) \in Q_T, \tag{1}$$

$$u(x,0) = u_0(x),\ u_t(x,0) = u_1(x),\ x \in \Omega, \tag{2}$$

$$u|_{\Gamma_T} = 0,\ \Gamma_T = \partial\Omega \times (0,T), \tag{3}$$

Under suitable condition on the data, we prove local and global existence theorems and study the finite time blow-up of the solutions. The analysis relies on the methods developed in [1, 2, 3]

References

[1] S. N. Antontsev, J.I. Díaz and S. I. Shmarev. *Energy Methods for Free Boundary Problems:Applications to Non-linear PDEs and Fluid Mechanics*. Bikhäuser, Boston, 2002. Progress in Nonlinear Differential Equations and Their Applications, Vol. 48.

[2] S. Antontsev and S. Shmarev, *Blow-up of solutions to parabolic equations with nonstandard growth conditions*, J. Comput. Appl. Math., 234 (2010), pp. 2633–2645.

[3] ——, *Anisotropic parabolic equations with variable nonlinearity*, Publ. Sec. Mat. Univ. Autònoma Barcelona, (2009), pp. 355–399.