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Hölder estimates for non-linear degenerate parabolic systems. (English) Zbl 0549.35061

J. Reine Angew. Math. 357, 1-22 (1985).

It is shown that for any weak solution of the nonlinear degenerate parabolic system

$$\partial u^i/\partial t - div(|\nabla u|^{p-2}\nabla u^i) = F_i(x,t,\nabla u) \quad (i=1,...,m)$$

in $\Omega \times (0,T)$ when $u=(u^1,...,u^m)$, $\Omega \subset \mathbb{R}^n$, $p > \max\{1, 2N/(N+2)\}$, the spatial gradient ∇u is Hölder continuous provided $|F_i(x,t,\nabla u)| \le C|\nabla u|^{p-1} + f_i(x,t), \quad f_i \in L^q, \quad q > pN/(p-1)$. The proof is based on the method of a previous paper by the authors in J. Reine Angew. Math. 349, 83-128 (1984; Zbl 0527.35038), but employs a new scaling (for the space-time cylinders) which reflects the degeneracy in the system. Using this type of scaling, it is also proved that the solution of the degenerate porous medium equation for anisotropic material is Hölder continuous.

MSC:

35K55 Nonlinear parabolic equations
35K65 Degenerate parabolic equations
35B45 A priori estimates in context of PDEs

Keywords:

weak solution; nonlinear degenerate parabolic system; Hölder continuous; scaling; space-time cylinders

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