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Journal of Convex Analysis 19 (2012) 063–090

G. Floridia

Dip. di Matematica e Informatica, Università di Catania, Viale A. Doria 6, 95125 Catania,
Italy
floridia@dmi.unict.it

M. A. Ragusa

Dip. di Matematica e Informatica, Università di Catania, Viale A. Doria 6, 95125 Catania,
Italy
maragusa@dmi.unict.it

Differentiability and Partial Hölder Continuity of Solutions of Nonlinear Elliptic Systems

The authors continue the study of regularity properties for solutions of elliptic systems started by M. A. Ragusa [(1) Local Hölder regularity for solutions of elliptic systems, *Duke Mathematical Journal* 113 (2002) 385–397; (2) Continuity of the derivatives of solutions related to elliptic equations, *Proc. Royal Society of Edinburgh* 136(A) (2006) 1027–1039], proving, in a bounded open set Ω of \mathbb{R}^n , local differentiability and partial Hölder continuity of the weak solutions u of nonlinear elliptic systems of order $2m$ in divergence form

$$\sum_{|\alpha| \leq m} (-1)^{|\alpha|} D^\alpha a^\alpha(x, Du) = 0.$$

Specifically, we generalize the results obtained by S. Campanato and P. Canarsa [Differentiability and partial Hölder continuity of the solutions of nonlinear elliptic systems of order $2m$ with quadratic growth, *Ann. Scuola Norm. Sup. Pisa* (4)8 (1981) 285–309] under the hypothesis that the coefficients $a^\alpha(x, Du)$ are strictly monotone with nonlinearity $q = 2$.

Keywords: Higher order nonlinear elliptic systems, divergence form, monotone coefficients, generalized Sobolev spaces, local differentiability.

MSC: 35J48, 35D10; 35J45, 35D30