Regularity of solutions to quasilinear elliptic systems

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The study of the regularity of weak solutions to nonlinear elliptic systems has been strongly motivated, and at the same time conditioned, by the De Giorgi's example of existence of unbounded weak solutions.

In a joint paper with G. Cupini and P. Marcellini we prove the local boundedness of weak solutions to the following class of quasilinear elliptic systems, including the case of general elliptic equations:

$$\sum_{i=1}^{n} \frac{\partial}{\partial x_i} \left(\sum_{j=1}^{n} a_{ij} \left(x, u, Du \right) \, u_{x_j}^{\alpha} + b_i^{\alpha} \left(x, u, Du \right) \right) = f^{\alpha} \left(x, u, Du \right) \tag{1}$$

 $\forall \alpha = 1, 2, \dots, m$. The regularity is proved assuming the anisotropic and p, q-growth of the leading part a_{ij} , the pertubation term b_i^{α} and the data f^{α} under sharp conditions on the exponents.