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The Keldysh-Fichera boundary value problems for degenerate quasilinear elliptic equations of second order. (English) Zbl 0731.35044

Differ. Integral Equ. 2, No. 4, 379-388 (1989).

The authors consider the following equation

$$D_i[a_{ij}(x,u)D_ju+b_i(x)u]-c(x,u)=f(x),\quad x\in\Omega\subset R^m,$$

where $\beta^{-1}a_{ij}(x,0)\xi_i\xi_j\le a_{ij}(x,z)\xi_i\xi_j\le\beta a_{ij}(x,0)\xi_i\xi_j$, $\beta=const>0$, $\lambda(x)|\xi|^2\le a_{ij}(x,0)\xi_i\xi_j$, λ (x)≥ 0 on $\bar\Omega$, with boundary conditions $u(x)=0$, $x\in\Sigma_2\cup\Sigma_3$, where $\Sigma_3=\{x\in\partial\Omega|\ a_{ij}(x,0)n_in_j>0$, $\vec n=(n_1,...,n_m)$ is the unit outward normal vector at $x\in\partial\Omega\}$,

$\Sigma\ _2=\{x\in\partial\Omega\setminus\Sigma_3|b_i(x)n_i>0\}$, $\Sigma_1=\partial\Omega\setminus(\Sigma_2\cup\Sigma_3)$.

Under some assumptions, the authors prove that the above problem has a weak solution (in some integral sense) which is also unique under additional restrictions. In this connection they establish an acute angle principle for weakly continuous mappings, discuss maximum and comparison principles and a maximum modulus estimate.

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MSC:

35J70	Degenerate elliptic equations
35B05	Oscillation, zeros of solutions, mean value theorems, etc. in context of PDEs
35D05	Existence of generalized solutions of PDE (MSC2000)

Keywords:

Keldysh-Fichera boundary value problems; uniqueness; acute angle principle; maximum modulus estimate