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Jahr: 1976

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3.11. Corollary. *Suppose* (3.1.1), (3.5.2), (3.7.1), (3.9.1) *and*

$$g(\xi) = 0 \quad \text{for} \quad \xi \geqq 0 . \tag{3.11.1}$$

Then the condition

$$\int_0^\pi p(\tau) \sin \tau \, d\tau \leqq 0 \tag{3.11.2}$$

is necessary and sufficient for the solvability of (3.1.4).

Proof. It remains to show that if

$$\int_0^\pi p(\tau) \sin \tau \, d\tau = 0 \tag{3.11.3}$$

then (3.1.4) has a solution. But this follows from the fact that if (3.11.3) is fulfilled then

$$u''(\tau) + u(\tau) = p(\tau) , \quad u(0) = u(\pi) = 0$$

has a nonnegative solution.

3.12. Remark. In the same way as in 3.9, it is possible to introduce an analogous condition to (3.9.1) to obtain the solvability of (3.1.4) for arbitrary $p \in C^0\langle 0, \pi\rangle$ if the assumption (3.7.1) is replaced by

$$g(\infty) = \infty ; \quad t_1 < t_2 \Rightarrow g(t_1) < g(t_2) .$$

3.13. Open problem. Let $g \equiv 0$. Is the condition (3.11.2) necessary and sufficient for the solvability of (3.1.4) with no restriction on $\nu > 1$?

Note added in September 1975. The problems in 2.20 are solved negatively by E. N. Dancer (see "On the Dirichlet problem for weakly nonlinear elliptic partial differential equations" — to appear). The periodic problem and boundary value problems for partial differential equations of the elliptic type are also solved in Dancer's paper.

References

[1] *A. Ambrosetti - G. Prodi:* Analisi non lineare (I quaderno), Pisa 1973.

[2] *A. Ambrosetti - G. Prodi:* On the inversion of some differentiable mappings with singularities between Banach spaces, Annali Mat. Pura Appl. *93*, 1973, 231—247; see also Theory of nonlinear operators, Proceedings of a Summer School held in September 1971 at Babylon, Czechoslovakia, Prague 1973, pp. 9—28.

[3] *H. Ehrmann:* Über die Existenz der Lösungen von Randwertaufgaben bei gewöhnlichen nichtlinearen Differentialgleichungen zweiter Ordnung, Math. Annalen *134*, 1957, 167—194.

[4] *S. Fučík:* Nonlinear equations with noninvertible linear part, Czech. Math. Journal *24 (99)* 1974, 467—495.

[5] *S. Fučík - M. Kučera - J. Nečas:* Ranges of nonlinear asymptotically linear operators, Journ. Diff. Equations *17*, 1975, 375—394.

[6] *S. Fučík - J. Nečas - J. Souček - V. Souček:* Spectral analysis of nonlinear operators, Lecture Notes in Mathematics No 346, Springer Verlag 1973.

[7] *M. A. Krasnoselskij:* Topological methods in the theory of nonlinear integral equations, Pergamon Press Book 1964.

[8] *E. M. Landesman - A. C. Lazar:* Linear eigenvalues and a nonlinear boundary value problem, Pac. J. Math. *33*, 1970, 311—328.

[9] *E. M. Landesman - A. C. Lazer:* Nonlinear perturbations of linear elliptic boundary value problems at resonance, J. Math. Mech. *19*, 1970, 609—623.

[10] *A. C. Lazer - D. E. Leach:* On a nonlinear two-point boundary value problem, J. Math. Anal. Appl. *26*, 1969, 20—27.

[11] *J. Leray - J. L. Lions:* Quelques résultats de Višik sur les problèmes elliptiques non linéaires par les méthodes de Minty-Browder, Bull. Soc. Math. France *93*, 1965, 97—107.

[12] *A. Manes - A. Micheletti:* Un'estensione della teoria variazionale classica degli autovalori per operatori ellittici del secondo ordine, Boll. Unione Mat. Ital. *7*, 1973, 285—301.

[13] *J. Nečas:* On the range of nonlinear operators with linear asymptotes which are not invertible, Comment. Math. Univ. Carolinae *14*, 1973, 63—72.

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