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ERRATUM ON "ON NEUMANN ELLIPTIC PROBLEMS WITH DISCONTINUOUS NONLINEARITIES" ARCH. MATH. (BRNO) 37 (2001), 25–31

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At this note we would like to point out some wrong arguments to the above mentioned paper. There, we have considered the following elliptic problem,

$$\left\{ \begin{array}{l} -\mathrm{div}(|Dx(x)|^{p-2}Dx(z)) = f(z,x) \ \text{ a.e. on } \ Z \\ -\frac{\partial x}{\partial \eta_p}(z) \in \partial j(z,x(z)), \ \text{ a.e. on } \ \Gamma. \end{array} \right\} \tag{1}$$

Here we do not assume that f is a Carathéodory function. A classical approach to this problem is to convert the single valued problem to a multivalued one by filling in the gaps. So, under some suitable hypotheses we have obtained the existence of a solution to the multivalued problem. But the difficulty comes in case we want to prove that this solution is also a solution to the single valued problem. For this purpose we must impose stronger conditions on the right-hand side. Our approach at that paper was to state a monotonicity condition on f so from a well known theorem we know that f have a countable number of discontinuities. At that paper we have try to prove it by assuming that f is somewhat decreasing. Of course the other case is when the right-hand side is increasing.

But in fact we have failed, because we have used the relation

$$(-\Phi)^0(x;v) = -\Phi^0(x;v)$$

and that relation was very important in our proof. But this relation does not hold. Unfortunately, we are unable to fixed it. So there is an open problem, namely, can we prove that if f is decreasing then the solution of the multivalued problem is also a solution of the single valued problem?

However, in the other case, namely, when f is increasing we can prove it and one can find such a results in [1], [2].

References

[1] Halidias, N., *Elliptic problems with discontinuities*, J. Math. Anal. Appl. **276**, No. 1 (2002), 13–27.

[2] Halidias, N., *Neumann boundary value problems with discontinuities*, Appl. Math. Lett. **16** No. 5 (2003), 729–732.

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