

THE USE OF W -DISCONTINUOUS FUNCTIONS IN MODELS OF ECONOMICS

INESE BULA

Institute of Mathematics of Latvian Academy of Sciences and University of Latvia

Akadēmijas laukums 1, LV-1524, Rīga, Latvia

E-mail: buls@lanet.lv

In the description of economic models by Arrow and Hahn [1] the existence of a market equilibrium is proved under the assumption of continuity of the excess demand function in this model. This assumption is replaced by the w -discontinuity which yields to an extension of the class of mathematical models to economics of such kind.

A class of w -discontinuous functions is defined as follows. Let (X, d) and (Y, ρ) be two metric spaces and w a positive number.

DEFINITION 1. A function $f: X \rightarrow Y$ is said to be w -discontinuous at the point $x_0 \in X$ if $\forall \varepsilon > 0 \exists \delta > 0 \forall x \in X : d(x_0, x) < \delta \implies \rho(f(x_0), f(x)) < \varepsilon + w$. A mapping f is called w -discontinuous in the set X if it is w -discontinuous at all points of X .

The constant w may not be the best possible (smallest) one. Very often, especially in economic applications, there is known only a rough upper estimation for the "jump".

The notion of w -discontinuous functions is not new. It is already found in K.Kuratowski [5] as the concept of *oscillation*. The notion of w -discontinuity (former w -continuity) was introduced by the author in [2].

We will examine the properties of w -discontinuous mappings and finally, under some additional conditions, we consider two different economic models with w -discontinuous excess demand function and prove the existence of a quasi-equilibrium in those models. These results are discussed in [3] and [4].

REFERENCES

- [1] K.J. Arrow and F.H. Hahn. *General competitive analysis*. North-Holland Publ. Company, 1991.
- [2] I. Bula. On the stability of Bohl-Brouwer-Schauder theorem. *Nonlinear Anal.*, **26** (11), 1996, 1859 – 1868.
- [3] I. Bula and D. Rika. Arrow-Hahn economic models with weakened conditions of continuity. *To appear*, 1-17.
- [4] I. Bula and M.R. Weber. On discontinuous functions and their application to equilibria in some economic model. *Preprint of Technische Universität Dresden*, MATH-AN-02-02, 2002, 1 – 20.
- [5] K. Kuratowski. *Topology I*. Academic Press, New York-London, 1966.