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HABILITATION THESIS REVIEWER'S REPORT

Masaryk University Faculty	Faculty of Science
Procedure field	Mathematics – Mathematical Analysis
Applicant	RNDr. Martina Pavlackova, PhD
Applicant's home unit, institution	Department of Computer Science and Applied Mathematics, Moravian College Olomouc
Habilitation thesis	Boundary value problems for second-order differential inclusions on compact and non-compact intervals in the Euclidean and abstract spaces
Reviewer	Valeri Obukhovskii, Doctor of Physical and Mathematical Sciences, Professor
Reviewer's home unit, institution	Head of the Chair of Higher Mathematics, Voronezh State Pedagogical University, Voronezh, Russian Federation

The thesis of Dr. Martina Pavlackova is devoted to the boundary value problems for differential inclusions. It consists of four chapters and the Attachments section where the author collected 12 published papers on which the thesis is based.

The application of topological methods to various boundary value problems of differential equations has a long history and is arising to the names of H. Poincare, J. Leray, J. Schauder, M.A. Krasnoselskii and other prominent scientists. Subsequently these methods were extended and developed by such researchers as J. Andres, L. Gorniewicz, W. Kryszewski, J. Mawhin and some others.

The investigation of M. Pavlackova adjoins this scientific direction. It deals with applications of the continuation principle and the bound sets method to the study of various boundary value problems for second-order differential inclusions.

After the preface, in the first chapter the author presents a detailed historical survey of achievements in the field of boundary value problems for second-order differential inclusions in finite-dimensional and Banach spaces as well as for impulsive inclusions.

The subject of the second chapter is an appropriate continuation principle which is first applied to problems on non-compact intervals in a finite-dimensional space and then its modifications for problems on compact intervals, problems in Banach spaces and impulsive problems are considered.

Since one of the most important conditions providing the applicability of the continuation principle is the transversality condition consisting of the absence of fixed points of the solution map on the boundary of an appropriate set in a corresponding functional space, the third chapter of the thesis is devoted to the development of the bound sets technique which can be used as an effective and convenient machinery for the verification of the transversality condition. In this chapter the bound sets method is studied for the cases of non-impulsive and impulsive cases as well as for problems in Banach spaces.

The fourth chapter is devoted to the detailed description of the author's contribution to the theory of boundary value problems for second-order differential inclusions on compact and and non-compact intervals in finite-dimensional and Banach spaces.

Summing up my impressions on the thesis under review, I'd like to say that it contains new and interesting scientific results. It is well and clearly written and organized. Dr. Pavlackova has made significant contributions to an important and relevant area in the sphere of topological methods in the theory of nonlinear differential equations and inclusions and now she may be considered as one of the leading experts in this part of contemporary mathematics. Her results are published in recognized international journals and presented at international level scientific conferences. I highly appreciate the scientific activity of Dr. Pavlackova and consider her to be a mature researcher with her own fairly important and relevant circle of interests.

Reviewer's questions for the habilitation thesis defence

1. What do you think of the opportunity to develop the methods described in your thesis to the case of nonconvex-valued inclusions by using the Fryszkowski-Bressan-Colombo selection theorem?

2. The bound sets approach looks similar to the guiding functions method which is also used for the solving of various boundary value problems. What do you think about the relations of these methods?

Conclusion

The habilitation thesis entitled "Boundary value problems for second-order differential inclusions on compact and non-compact intervals in the Euclidean and abstract spaces" by Martina Pavlackova **fulfils** requirements expected of a habilitation thesis in the field of Mathematics – Mathematical Analysis.

Date: 04/12/2020   Signature: