

Opinion of the dissertation of the candidate Eng. Rohitha Keerthiwansa entitled "Design and validation of methods for comprehensive characterization of the hyperelastic properties of elastomers"

Reader: Ass.Prof. Dagmar Měřínská, Ph.D.

The presented dissertation deals with the study of the possibilities of describing rubbers, ie hyperelastic substances using modified mathematical models so that these properties typical for this group of polymers can be captured in the best way.

The presented work is divided into theoretical and practical part. The theoretical part briefly but in sufficient detail describes the basic properties of rubbers and their preparation, ie the properties of the most common types of rubbers, the composition and preparation of rubber compounds and their vulcanization. Then the basic properties and possibilities of their mathematical description are given. Finally, a statistical view of the validity of these models for individual cases is summarized. The whole part is supported by a sufficient number of links from foreign sources.

In the practical part, the individual steps of solving the set goals are logically arranged one after the other. First, the process of monitoring the properties of six prepared mixtures was evaluated by describing the values from the uniaxial type of stress in order to identify and describe its shortcomings. Gradually, additional data from multiple stresses were added and again the agreement of models and measured data was monitored. This observation was then supplemented by statistical evaluation to determine the validity of the data obtained for individual models. Experimental work shows that the candidate is capable of scientific work, can process the obtained data, draw conclusions from them and on the basis of them plan the progress of further experiments.

Comments and questions:

1. Is the rubber structure shown in Fig. 3.10 correct?
2. In the description of rubbers you do not mention butyl rubber, IIR. Could you describe it and state its main uses?
3. Why do EPM and EPDM rubbers (rubber from them) have excellent resistance to oxygen and ozone?
4. Your blends vary in hardness. Is it possible to prepare rubber with thermosetting properties?
5. Would it be possible to use other properties of rubbers for your evaluation?

The presented work meets the basic formal requirements, is correctly designed, but contains minor misprints and errors in the English language. However, this does not reduce its quality and the importance of the results obtained, and therefore I recommend it for defense.

In Zlin 29.10.2020

Ass.Prof. Dagmar Měřínská, Ph.D.

