

## Opponent's report for the habilitation thesis entitled Commutative automorphic loops by Přemysl Jedlička

The theory of loops and quasigroups was founded by German and US mathematicians in the 1930's, motivated by geometric and abstract algebraic questions. Soon, the connection to combinatorics and group theory became very important. In fact, loops never belonged to the so called mainstream mathematics, but in the last decades they have always been able justify their relevance by producing questions and by applying sophisticated methods from different branches of mathematics. In the recent history of loop theory, the LOOPS'99 conference in Prague has been a notable milestone. This and the follower LOOPS and Mile High conferences brought together a generation of researcher who gave a new momentum to the research in the theory of loops and quasigroups. Among the leading experts, there is a consensus to identify automorphic loops as one of the hottest topics in loop theory. Automorphic loops have a rich algebraic structure, which is far from being easy to understand, therefore deep results and completely new methods from abstract algebra, group theory, theory of Lie rings and automated reasoning techniques are needed to handle it.

By now, also thanks to important contributions of Dr. Jedlička, the structure of commutative automorphic loops is well understood. Although groups are automorphic loops, from abstract algebraic point of view, the class of commutative automorphic loops much richer than the class of abelian groups. Only to mention that the solvability of finite commutative loops is a highly nontrivial result by Grishkov, Kinyon and Nagy, or, the plenty of examples of finite commutative automorphic loops of exponent 2 with trivial center. Such constructions constitute the main parts of chapters 2, 5 and 6; these are with no doubt top mathematical achievements of Dr. Jedlička. Another result I must mention is Theorem 3.12, the "Odd Order Theorem" for commutative automorphic loops. The proof relies on a brilliant trick by introducing the associated Bruck loop of a 2-divisible commutative automorphic loop (Lemma 3.5). Later, this method has been extended to 2-divisible automorphic loops by Kinyon, Kunnen, Phillips and Vojtěchovský and yielded the "Odd Order Theorem" for automorphic loops.

I hope that my opinion on Dr. Jedlička's scientific work is clear by now. His dissertation rely on papers which deal with relevant questions of modern loop theory. The results are nontrivial, they use methods from different areas of mathematics and can be published in top mathematical journals. Dr. Jedlička is an important personality in the group of leading experts of loop theory, a look at the list of his co-authors proves this. At the same time, he shows his scientific independence by publishing single-authored papers as well. According to Zentralblatt, he has 20 mathematical papers. And, last but not least, he is an excellent speaker and a very friendly person. Several times I had the pleasure to meet him personally and to listen to his well prepared talks at international conferences.

Resuming my opinion, I am very much convinced that Dr. Přemysl Jedlička fulfills all criteria of habilitation. I strongly recommend to award him this title.

Szeged (Hungary), 13 -03- 2018