

Report on the Habilitation thesis
Automata Theoretic Methods and Algorithmic Algebra
by Tatiana Jajcayová

The presented thesis contains, in addition to one-page Foreword, five papers of the candidate. Two of them are published in scientific journals, three in conference proceedings. Each paper is accompanied by a short introduction (a longer one for the first paper).

The topic declared by the title is treated by first two texts. The first paper (*The Words for HNN-extensions of Free Inverse Semigroups*, LATA 2016, LNCS 9618) studies conditions, related to the corresponding Schützenberger automaton, under which the word problem in a HNN-extension is decidable. Those conditions are shown to be satisfied if the extended inverse semigroup is free.

The second paper (*Maximal subgroups of amalgams of finite inverse semigroups*, Semigroup Forum 2015, coauthored by A. Cherubini and E. Rodaro) again uses structural properties of Schützenberger automata for a characterization of certain maximal subgroups as indicated by the title.

Remaining three texts are only remotely connected to the theory of finite automata and their application in algorithmic algebra. The paper (*Oblivious transfer and private information retrieval based on the p -subgroup assumption*, SOFSEM 2005, coauthored by A. Yamamura and T. Kurokawa) proposes a cryptography protocols for oblivious transfer and private information retrieval. The scheme is a straightforward application of the Okamoto-Uchiyama cryptosystem, which is an example of a number theoretic cipher using cyclic groups of high prime order.

Next paper (*Generalized Difference Sets*, MiST 2014) is a survey that popularizes several results (some of them obtained by the author) about difference sets of natural numbers.

Finally, the last paper (*Palindromic closures using multiple antimorphisms*, Theoretical Computer Science 2014, coauthored by E. Pelantová and Š. Starosta) belongs to combinatorics of infinite words. The paper describes properties of the generalized Thue-Morse word related to generalized palindromic closures. This type of research is relatively recent, and it was introduced by coauthors of the present paper.

The core of the thesis are undoubtedly the first two papers which thematically fit the thesis's title and develop the author's Ph.D. thesis. They testify that the candidate is an expert in the combinatorial theory of inverse semigroups.

A weakness of the thesis is that it contains only two papers published in scientific journals, both of them coauthored. Especially, one can regret that the first paper of the collection, which belongs to its core and of which the candidate is a sole author, is only a contribution to an average quality conference.

Let me also remark that the accompanying introductory texts, mostly excerpts from preliminaries of corresponding papers, would deserve more care. The longer text before the first paper can hardly serve as an introduction to inverse semigroups for the reader. For example, Green's relations are used in this first text while being introduced only in the next chapter. Also, the references of the first paper got lost.

Despite the above criticism, I recommend that dr. Jajcayová be named *docent*.

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doc. Štěpán Holub, Ph.D.