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Selfgenerating sequences and different types of computational devices [Abstract of thesis]

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DECIDABILITY QUESTIONS FOR SOME DYNAMIC PROPERTIES OF PETRI NETS

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(14.12.1988, supervisors M.Vlach, M.Chytil)

The thesis contains three main results:

1) the decidability of "relative boundedness" of a given place — that means boundedness in those reachable markings in which chosen places posses given numbers of tokens; it is a nontrivial corollary of the decidability of the well–known reachability problem,
2) the undecidability of the existence of an infinite (strongly) fair firing sequence; an alternative proof was given in [1] independently,
3) the decidability of the existence of an infinite weakly fair firing sequence; it was an open problem in [1] and [2].

References

[1] Carstensen H., *Decidability questions for fairness in Petri nets*, Proc.STACS'87, LNCS 247 Springer (1987).

[2] Howell R., Rosier L., Yen H., *A taxonomy of fairness and temporal logic problems for Petri nets*, Proc.MFCS'88, LNCS 324 Springer (1988).

SELFGENERATING SEQUENCES AND DIFFERENT TYPES OF COMPUTATIONAL DEVICES

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Features of selfgenerating sequences are studied in this work in relation with different types of computational devices and their generation power. Complexity of generation of the class of sequences generated by Turing machines is there investigated.

Results written below were achieved:

1. Mealy automata, one way pushdown automata and two way finite automata generate the smallest class of sequences and these sequences are periodical.
2. Two way pebble automata and two way counters generate bigger class than the class of periodical sequences.
3. Turing machines generate the biggest class of sequences.

These results are interesting when compared to the results of formal languages theory in which two way pebble automata generate the same class of languages as Mealy automata and pushdown automata generate bigger class of languages than Mealy automata.