

a) Subject:

“Computational complexity and tractability in the case of selected difficult optimization problems” (general topic)

b) Supervisor, contact, place of research:

Krzysztof SZKATUŁA, PhD, DSc, e-mail Krzysztof.Szkatula@ibspan.waw.pl, Systems Research Institute, Polish Academy of Sciences, ul. Newelska 6, 01-447 Warszawa, Poland.

c) Project Description:

The subject of interest will be selected, difficult optimization problems, with particular emphasis on discrete optimization problems. For the problems being considered, issues related to the computational complexity of the problem and known optimal for all instances of the problem algorithms will be analyzed in detail. The research will aim to determine the classes of instances of the considered problem and methods of solving it, for which the problem is computationally tractable. It means that the optimal solution to the problem will be determined in a “reasonable” computational time, e.g. measured as a number of elementary arithmetic operations. For classes of intractable problem instances, different techniques such as relaxations of selected assumptions of the problem or approximate methods, i.e. ones not guaranteeing to determine optimal solutions, will be considered.

d) Bibliography:

M.R. Garey and D.S. Johnson. Computers and Intractability: A Guide to the Theory of NP-Completeness. Freeman, San Francisco, 1979.

M.M. Sysło, N. Deo, and J.S. Kowalik. Discrete Optimization Algorithms. Prentice-Hall Inc., Englewood Cliffs, 1983. Polskie tłumaczenie: Algorytmy optymalizacji dyskretnej z programami w języku Pascal, Wydaw. Nauk. PWN, Warszawa, 1993.

G.L. Nemhauser and L.A. Wolsey. Integer and Combinatorial Optimization. JohnWiley & Sons Inc., New York, 1988.

C.H. Papadimitriou, Computational Complexity. Addison Wesley, 1994.

C.H. Papadimitriou and K. Steiglitz. Combinatorial Optimization: Algorithms and Complexity. Prentice-Hall, Englewood Cliffs, 1982, second edition, Dover, 1998.

e) Date: 9/06/2019