

# A CONTRIBUTION TO TIME COMPLEXITY OF CPM-BASED PROBLEMS

SEDA, M.

**Abstract:** *Critical Path Method (CPM) is a well known tool in project scheduling where time duration of activities and their precedence relationships are defined and resource capacities are not limited. In practice, this is usually not satisfied. In spite of this, the CPM serves as a base for more general methods such as PERT, solving the Resource Constrained Project Scheduling Problem (RCPSP), and Job Shop Scheduling Problem (JSSP) when it is represented by a disjunctive graph. RCPSP and JSSP are NP-hard problems and therefore it is necessary to solve them by heuristic methods. Here, with respect to the high number of iterations, the effectiveness of the CPM calculations plays a substantial role. This contribution proposes a new implementation of the CPM using a lexicographical ordering of edges in network graphs and shows that its time complexity is lower than that of classical approaches. This conclusion is verified using a representative sample of benchmarks.*

**Key words:** *CPM, PERT, time complexity, NP-hard problems, lexicographical ordering*



**Authors' data:** Doc. RNDr. Ing. Ph. D. Seda M.[ilos], Brno University of Technology, Faculty of Mechanical Engineering, Czech Republic, seda@fme.vutbr.cz

**This Publication has to be referred as:** Seda, M. (2006). A Contribution to Time Complexity of CPM-Based Problems, Chapter 44 in DAAAM International Scientific Book 2006, B. Katalinic (Ed.), Published by DAAAM International, ISBN 3-901509-47-X, ISSN 1726-9687, Vienna, Austria  
DOI: 10.2507/daaam.scibook.2006.44