ABSTRACT

Master's thesis: 117 pages, 32 figures, 23 tables, 1 appendix, 125 references.

Relevance. The theory of schedules and operational scheduling are important and interesting directions in the field of optimization and are currently experiencing a period of rapid development. This is connected, first of all, to the emergence of fundamentally new types of products, technologies, intensification of production, its continuous updating and improvement. The rapid development of communication systems, the Internet, logistics structures puts for mathematicians new tasks, including in the field of scheduling theory. In practice, there are many diverse tasks of calendar planning of production and sales of products, the efficient use of equipment and other resources, the coordination of the work of various services, and so on.

A variety of mathematical models and scheduling methods usually puts for mathematicians and programmers the inevitable problem of constructing fast algorithms and their effective program implementation, taking into account the features of a solvable problem.

Most tasks in the theory of scheduling and operational scheduling are NP-hard, and there are serious difficulties in solving them, since building an optimal schedule requires a great deal of time even with relatively small dimensions of the input data. In such a situation, it is necessary to conduct more in-depth research of problems within the framework of complexity theory.

In this regard, it is important to develop a software product for drawing up schedules for the execution of tasks with parallel devices, which will help minimize the total deviation from the policy terms.

Relationship of work with scientific programs, plans, themes. The work was carried out at National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute» the department of Computer-Aided Management and Data Processing Systems within the theme "Effective methods for solving the problems of the theory of schedules" (state registration number 0117U000919).

Purpose and objectives of the study. Improving the efficiency of scheduling by building optimal or near to optimal schedules and minimizing the total deviation time from the due dates.

The following **tasks**:

- performing the known scheduling results review;
- developing an algorithm for minimizing total deviation time from the due dates for parallel machine scheduling;
- developing a software implementation of the algorithm in a form that can be used for schedule optimizing;
- performing an analysis of the results.

The object of study is the process of operational scheduling.

Subject of research: models and methods for solving scheduling problems in order to minimize the total deviation of task`s execution from due dates by parallel machines.

Research methods: theory of schedules, operations research and complexity theory.

Scientific novelty of the research. The approach is developed to solve the problem of minimizing the total deviation of completion times from due dates by parallel machines. The method for solving the problem of minimizing the total deviation of completion times from due dates by parallel machines and has statistically stable high performance indicators.

Publications. The materials are presented in the scientific article of the international scientific journal "Scientific Review" [123] (certificate of state registration КВ № 20878-10678Р), published in the abstracts a scientific conference of students, undergraduates and graduate students "Informatics and Computer Science" - ICT-2018 [124] and accepted for publication at 20th International scientific-technical conference SAIT 2018 "System analysis and information technologies" [125].

PARALLEL MACHINES, DUE DATE, SCHEDULING, MINIMIZING TOTAL DEVIATION