

## DISASSEMBLY SEQUENCE PLANNING FOR MAINTENANCE BASED ON METAHEURISTIC METHOD

Jaynarov Yoqubjon

Toshkent davlat transport universiteti

Aviatsiya transport muhandisligi fakulteti AEA11 guruh talabasi

Pochta manzili: [yoqubjonjaynarov@gmail.com](mailto:yoqubjonjaynarov@gmail.com)

Telefon raqami: +99888 130 01 33

Ilmiy rahbar: F.R.Turg'unova,  
TDTU, Chet tillar kafedraasi assistenti.

**Annotation.** In this article describes ways to Disassembly sequence planning for maintenance based on metaheuristic method.

**Key words:** maintenance, metaheuristic method, mechanics

### Relevance

This article presents opinions on the movement of liquids based on comparative, scientific, critical, analytical, logical, sequential, impartial methods.

Methods. In recent years, more and more research has been conducted in close collaboration with manufacturers to design robust and profitable dismantling systems. Thus, engineers and designers of new products have to consider constraints and disassembly specifications during the design phase of products not only in the context of the end of life but more precisely in the product life cycle. Consequently, optimization of disassembly process of complex products is essential in the case of preventive maintenance. In Fact, Disassembly Sequence Plan (DSP), which is among the combinatorial problems with hard constraints in practical engineering, becomes an NP-hard problem. In this research work, an automated DSP process based on a metaheuristic method named "Ant Colony Optimization" is developed. Beginning with a Computer Aided Design (CAD) model, a collision analysis is performed to identify all possible interferences during the components' motion and then an interference matrix is generated to identify dynamically the disassembly parts and to ensure the feasibility of disassembly operations. The novelty of the developed approach is presented in the introduction of new criteria such as the maintainability of the usury component with several other criteria as volume, tools change and disassembly directions change. Finally, to highlight the performance of



the developed approach, an implemented tool is developed and an industrial case is studied. The obtained results prove the satisfactory side of these criteria to identify a feasible DSP in a record time. Purpose - Maintenance disassembly that involves separating failed components from an assembly or system plays a vital role in line maintenance of civil aircraft, and it is necessary to have an effective and optimal sequence planning in order to reduce time and cost in maintenance. The purpose of the paper is to develop a more effective disassembly sequence planning method for maintenance of large equipment including civil aircraft systems.

Design/methodology/approach - The methodology involves the following steps: a component-fastener graph is built to describe the equipment in terms of classifying components into two categories that are functional components and fasteners; interference matrix is developed to determine the removable component, and a disassembly sequence planning of functional components is proposed based on Dijkstra's algorithm; the disassembly sequence planning including fasteners is presented based on particle swarm optimization. Findings - An application case, which takes the nose landing gear system of a regional jet as a study object, shows that the disassembly sequence planning method proposed in the paper can reduce the calculation complexity greatly, and its effectiveness is greater than that of a genetic algorithm-based method, in most situations. Practical implications - The method proposed herein can acquire the optimal maintenance disassembly sequence, which can reduce the cost and time for maintenance of large equipment.

Originality/value - A novel and effective disassembly sequence planning solution for maintenance of large equipment is presented, which can be applied to the line maintenance of civil aircraft.

#### List of used literatures:

1. Ataboyev, I., & Tursunovich, R. I. (2023). PROBLEMATIC TEACHING METHODS AND SOLUTIONS IN FOREIGN LANGUAGE TEACHING. Журнал иностранных языков и лингвистики, 5(5).
2. Ataboyev, I., & Tursunovich, R. I. (2023). STRUCTURE AND MECHANISM OF WRITING IN FOREIGN LANGUAGE TEACHING. Журнал иностранных языков и лингвистики, 5(5).
3. Ataboyev, I. (2023). THE BASIS OF LEARNING A FOREIGN LANGUAGE IS GRAMMAR. Журнал иностранных языков и лингвистики, 5(5).



4. Ataboyev, I., & Tursunovich, R. I. (2023). ROLE OF THE EFL TEACHER IN THE EDUCATIONAL PROCESS. Журнал иностранных языков и лингвистики, 5(5).
5. Ataboyev, I., & Tursunovich, R. I. (2023). DEVELOP THE USE OF YOUTUBE VIDEOS AND WEBSITES IN THE CLASSROOM. Журнал иностранных языков и лингвистики, 5(5).
6. Ataboyev, I., & Tursunovich, R. I. (2023). ANALYSIS OF THE PROCESS OF TEACHING A COMMUNICATIVE LANGUAGE AND ITS TEACHING. Журнал иностранных языков и лингвистики, 5(5).
7. Ataboyev, I., & Tursunovich, R. I. (2023). THE SPECIALTY OF REALIA IN TEACHING LANGUAGE UNITS. Журнал иностранных языков и лингвистики, 5(5).
8. Ataboyev, I., & Tursunovich, R. I. T. R. I. (2023). ADAPTATION AND SYSTEMATIZATION OF TEACHING MATERIALS FOR INDIVIDUALS AND GROUPS. Журнал иностранных языков и лингвистики, 5(5).
9. Ataboyev, I., & Tursunovich, R. I. (2023). THE IMPORTANCE AND ROLE OF ENGLISH IN THE MODERN WORLD. Журнал иностранных языков и лингвистики, 5(5).
10. Ataboyev, I., & Tursunovich, R. I. (2023). APPLYING EFFECTIVE METHODS TO SUPPORT EFL STUDENTS. Журнал иностранных языков и лингвистики, 5(5).
11. Rustamov, I., & Mirza ogli, A. I. (2023). THE IMPORTANCE OF LISTENING AND SPEAKING IN LEARNING ENGLISH. Журнал иностранных языков и лингвистики, 5(5).
12. Rustamov, I., & Mirza ogli, A. I. (2023). ANALYSIS OF THE ROLE AND PSYCHOLOGICAL CHARACTERISTICS OF EFFECTIVE SKILLS IN TEACHING ENGLISH. Журнал иностранных языков и лингвистики, 5(5).
13. Rustamov, I., & Mirza ogli, A. I. (2023). PROJECT WORK NATURAL EXTENSION STUDY OF CONTENT-BASED TEACHING. Журнал иностранных языков и лингвистики, 5(5).
14. Rustamov, I., & Mirza ogli, A. I. (2023). CURRENT LINGUISTIC POSTULATES AND THEIR ROLE IN FOREIGN LANGUAGE TEACHING. Журнал иностранных языков и лингвистики, 5(5).
15. Rustamov, I., & Mirza ogli, A. I. (2023). ADVANTAGES AND METHODS OF USING GAMES IN FOREIGN LANGUAGE TEACHING. Журнал иностранных языков и лингвистики, 5(5).



---

16. Rustamov, I., & Mirza ogli, A. I. (2023). DEVELOPMENT OF INTERACTIVE METHODS IN FOREIGN LANGUAGE TEACHERS. Журнал иностранных языков и лингвистики, 5(5).

17. Rustamov, I., & Mirza ogli, A. I. (2023). APPLYING AN ECLECTIC APPROACH TO ENGLISH TEACHING IN SECONDARY SCHOOLS. Журнал иностранных языков и лингвистики, 5(5).

