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CONTROL SYSTEM FOR MARINE DIESEL ENGINE LUBRICATION PROCESS WITH PREDICTIVE MODELING

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The reliability of the ship's diesel engine largely depends on an effective lubrication regime, the use of high-quality lubricant, and the timely cleaning of surfaces from contamination [1]. Accounting for disturbances in operating modes is a difficult task, as they often cannot be accurately measured. In this regard, a promising approach is the use of predictive models.

The purpose of the work is to study the possibilities of controlling the oil injection process for a marine diesel engine using a predictive model that will ensure the optimal lubrication mode, increase the reliability of engine operation and reduce operating costs by taking into account disturbing factors and adapting the system to changing operating conditions.

It is known that this method is based on knowledge of the dynamic characteristics of processes and is a development of classical control with negative feedback, which takes into account the prediction of the behavior of the control object on various types of input influences. The controller uses an empirical model of the controlled process to predict the future behavior of the object based on the previous values of the state variables. Neural network or fuzzy inference methods can be used to determine the coefficients of this model [2]. The control strategy is chosen taking into account the interrelationships between the parameters describing the state of the object, the limitations of the control devices and the possibilities of choosing the optimal trajectory of the change of states in the set of permissible states of the system.

References

1. Tadros, M., Ventura, M. & Guedes Soares, C. Optimization of the Performance of Marine Diesel Engines to Minimize the Formation of SOx Emissions. J. Marine. Sci. Appl. 19, 473–484 (2020). DOI: 10.1007/s11804-020-00156-0

2. Бігун С.В. Система керування процесом упорскування циліндрового мастила суднових двигунів із нечітким регулятором / С.В. Бігун, А.Л. Сіманенков, Ю.О. Лебеденко // Прикладні питання математичного моделювання. Т. 7, №1, 2024, С. 11-22.