

THE IMPACT OF NUMERICAL SIMULATION OF FLUID FLOW IN A HYDRAULIC TURBINE

Mironov K.A., Oleksenko Yu.Yu.
National Technical University
«Kharkiv Polytechnic Institute»,
Kharkiv

The development of modern technology in the design of hydraulic turbines is very important in our time. By conducting a study of the fluid flow in the flow part of a high-pressure Francis turbine, we can increase its energy performance, which will lead to an increase in efficiency. Thus, during the reconstruction and modernization of hydropower plants in Ukraine and abroad will be able to increase the efficiency of the turbines themselves.

The study and its analysis affect the economic and political component, as well as the environment, which is an important issue today.

The economic impact lies in the development of new products and services that increase the productivity and efficiency of hydraulic turbines. Work on the subject matter of this study will lead to the development of future technologies, including innovations of commercial value. The design and construction of a hydropower plant and in particular a turbine is an expensive project requiring large investments and labor hours. When using this study, we reduce the economic part and the detrimental effect on the environment. The analysis of indicators showed the feasibility of further studies of the flow part of the high pressure Francis turbine. This CFD approach reduces costs and time compared to the experimental approach and allows you to improve and analyze the performance of the turbine and its design before making the model.

An important factor is the political component. Developing scientific activities in this direction, we will be able to receive orders and cooperation with countries where there are hydroelectric power stations. New partners and investors will appear for the country's economy, as well as government orders.

Environmental Impact: Using computer calculations, we achieve higher efficiency and improve all energy performance. In this way, the harmful production of turbine parts is reduced since, according to the calculation results, a hydraulic turbine is manufactured in its final form. Using the CFD forecasting approach, we eliminate possible errors and unnecessary turbine models. Due to the reduction in production, harmful emissions from plants are reduced. With higher efficiency, the efficiency of generating electricity through water increases. To preserve nature, we should pay more attention to renewable energy sources, one of which is hydropower. Water energy conversion is an environmental type of electricity production.

The use of modern technologies for the design of hydraulic turbines will increase energy efficiency and reduce the economic component. This will allow engineers to see the picture of the fluid flow in the initial stages of computer design. By reducing losses in the flow part, we improve the quality of the turbine itself.