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**Analysis of the Pump Strength to Extend its Lifetime**

*The paper deals with the estimation of the residual strength of the body of water jet pump SN-10 /50K type operating in the beyond design lifetime in the line of NPP unit sprinkler pumps. The results of theoretical studies of its stressed-strained state are presented taking into account change in the geometry of body parts, which was observed after completion of the design lifetime. Static strength assessment was carried out for the main operating modes of the pump operation (normal operating conditions and hydraulic tests), as well as for conditions of an emergency situation.*

*Corresponding researches were carried out in the framework of numerical computer simulation on the basis of the finite element method using up-to-date software complexes. 3D finite element models have been developed that take into account actual geometry of the pump components and the forecast of its possible change for a period of extended lifetime. The change in the design geometry is taken into account based on the extrapolation of the data of thickness measurement of the pump body walls obtained during the long service period.*

*Based on the built finite-element models, the tasks of thermal conductivity and thermoelasticity have been consistently solved. The phenomenon of thermal shock on body parts was simulated that allow assessing residual pump strength in case of an emergency. Corresponding simulation was carried out by solving the problems of non-stationary thermal conductivity and the related problem of quasi-static thermoelasticity. Such an approach made it possible to determine the distribution of the temperature field over time under thermal shock, and the distribution of the stressed-strained state parameters of the pump at certain time moments.*

*Keywords: NPP pumps, finite element method, stress-strained state, residual strength, thermal shock, operational body components thinning.*