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Innovative nuclear energy source of 30 MW power for distilling desalination systems

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Abstract

The conception of the nuclear-desalination complex (NDC) designed to get fresh or other kind of water is proposed. The NDC consists of the innovative modular nuclear energy source (NES for seawater heating with low-level thermo technical parameters and multistage desalination installation of the distilling type. As much as two modular reactors, each of ~ 30 MW thermal powers, with 100% natural circulation of lead-bismuth eutectic (LBE) coolant in the primary circuit, are included unto the composition of NES. The construction of the modular reactor heat exchanger completely excludes the possibility of LBE contact with the water. In the whole, the science and technology approach applied to the modular reactor conception fundamentally simplifies its design and considerably reduces the amount of the equipment used. In particular, such standard equipment as vapor-turbine and pump complexes, as well as the heating and shutting-down systems is excluded at all. As a result, a high control and operation reliability and increased working resources are provided. Also all requirements related to the international nuclear and radiation safety standards, non-proliferation, and anti-terrorists protection are fully executed. The multistage desalination installation is based on the MED-process and is separated from the NES by the design applied. One such NDC can provide the necessary amount of fresh water the city with population of 100K people and more. Thus, the proposed NDC is a completed product in the viewpoint of its commercial use in the future. The goal of this paper is to present the main technical parameters of the NDC with the focus on the conceptions and capabilities of the innovative NES for seawater heating.

Biography

Svyatoslav Ignatyev has completed his Ph.D. in Physics and Mathematics at the age of 35 years from the Russian National Research Nuclear University MEPhI. He is the adviser to director in the Institute for Physics and Power Engineering named after A.I. Leypunsky. He has published more than 100 papers in different journals and proceedings of domestic and international conferences.