**ALGORITHMS FOR DESIGNING POWERFUL MULTICAVITY KLYSTRONS**

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To calculate the characteristics of high-power klystrons, the two most commonly used approaches. In the first case, the initial-boundary value problem for the system of Maxwell's equations and the equations of motion of relativistic charged particles are solved jointly by a numerical method. This formulation allows not only modeling the processes of interaction of beams with a high-frequency field, but also taking into account many important physical effects (multipactor, dark currents, breakdown phenomena, etc.), but it requires large computational resources.

Another approach uses simplified semi-analytical models, such as one-dimensional models of charged disks and plates, or two-dimensional models of rings and bars. In this case, the calculation of a multicavity klystron takes seconds or minutes, which allows in the preliminary design to carry out multiparameter optimization of the parameters of a powerful multicavity klystron with modest computing resources.

The Super S-tau Factory project [1], carried out by the Institute of Nuclear Physics of the Siberian Branch of the Russian Academy of Sciences, makes the development of a 50-megawatt S-band klystron especially topical. The paper describes the algorithms for calculating and designing such a klystron, as well as the characteristics of the program created for this purpose. Comparisons of the results obtained by this program with the results of calculations using the CST Microwave Studio are given.

Algorithms for designing individual elements and assemblies of advanced multi-beam klystrons and sheet-beam klystrons (electron guns, cavities etc/) based on the boundary element method are described in the author's monograph [2].

1. https://ctd.inp.nsk.su/c-tau/.

2. V. Ivanov. Computational methods, optimization and synthesis in electron optics. - Hmbg: Palmarium Academic Publishing, 2016. -525 pp.