On the Possibility of a Numerical Solution of the Heat and Mass Transfer Problem Jointly by the Matrix Method and the Method of Generalized Powers of Bers

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In this paper, we consider some possibilities for the joint use of the matrix method and the method of generalized powers of Bers ([1], [2]) for the numerical solution of the heat and mass transfer problem by solving the problem of diffusion of minority charge carriers generated by a wide electron beam in a semiconductor target. Initially, the matrix method under consideration was used by us for the analytical solution of the problem of heat and mass transfer in a homogeneous or multilayered medium with shear, axial or central symmetry for an arbitrary number of layers [3]. Such a generality of the method is achieved due to the application of the apparatus of generalized powers of Bers, which makes it possible to obtain a solution for all the above types of symmetries of the medium in a single analytical form. Simulation is reduced to the sequential multiplication of second-order functional matrices whose components at each point are determined by the physical and geometric parameters of the current layer. The main advantage of the matrix method is that it can be used for any number of layers. It is this property of the method that makes it possible to consider of its application as a numerical one if it is artificially to split the medium into many layers.

The relative error in the computations was estimated at a uniform norm beside the analytical solution. The errors obtained at different electron beam energies and different number of mesh point were from 0.8% to 2.9%.

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