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ANALYTICAL SOLUTION OF A TWO-DIMENSIONAL DOUBLE-FIN ASSEMBLY

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Extended surface is used specially to enhance the heat transfer between a solid and surrounding medium. Such an extended surface is termed a fin. The rate of heat transfer is directly proportional to the extent of the wall surface, the heat transfer coefficient and to the temperature difference between solid and the surrounding medium. Finned surfaces are widely used in many applications such as air conditioners, aircrafts, chemical processing plants, etc. Finned surfaces are also used in cooling electronic components. In [1] is considered performance of a heat - exchanger consisting of rectangular fins attached to both sides of plane wall. In [1,2] works one-dimensional steady-state double-fin assembly problem is compared with the single-fin assembly. In paper [3] mathematical three-dimensional formulation of transient problem for one element with one rectangular fin is examined, reduce it by conservative averaging method to the system of three heat equations with linear sink terms. In [4] was considered exact analytical solution for two-dimensional steady-state process for system with one rectangular fin by the method of Green function [5].

This paper deals with mathematical three-dimensional formulation of steady-state problem and transient problem for heat-exchanger consisting of rectangular fins attached to both sides of a plane wall(double-fin assembly) and reduce it by conservative averaging method to the two-dimension system of the three Laplace equations (for steady-state system). Analytical solution based on Green function approach is proposed. This solution is obtained in the form of 2^{nd} kind Fredholm integral equations.

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