
THERMAL CHARACTERISTICS OF A FUNCTIONALLY GRADED POROUS FIN INFLUENCED BY CONVECTION AND RADIATION EFFECTS

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ABSTRACT

A nonlinear heat transfer problem is considered for a rectangular functionally graded fin with temperature-dependent internal heat generation and thermal conductivity. Darcy's law is used for the energy ratio equation. Heat generation and thermal conductivity are assumed to obey power-law grading. Under these circumstances, the irregular nonlinear heat transfer equation acquired is transformed into a nonlinear equation system via the pseudospectral Chebyshev method. Afterward, the fixed-point iteration technique is employed to solve the nonlinear linear equation system. The benchmark problem serves to evaluate the method's accuracy. The influence of Rayleigh number, convective, and radiative heat parameters on the thermal efficiency of the porous functionally graded fin is discussed..

Keywords Porous fin · Convection and radiation · Functionally graded materials · Pseudospectral Chebyshev method

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