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**A decomposition method for solving the convective longitudinal fins with variable thermal conductivity.** (English) Zbl 1011.80011

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**Summary:** The Adomian decomposition method is used to evaluate the efficiency and the optimal length of a convective rectangular fin with variable thermal conductivity, and to determine the temperature distribution within the fin. It is a useful and practical method, which can be used to solve the nonlinear energy balance equations which are associated with variable thermal conductivity conditions. The Adomian decomposition method provides an analytical solution in the form of an infinite power series. From a practical perspective, it is necessary to evaluate this analytical solution, and to obtain numerical values from the infinite power series. This requires series truncation, and a practical procedure to accomplish the task. Together, these transform the analytical results into a solution with a finite degree of accuracy. The accuracy of the Adomian decomposition method with a varying number of terms in the series is investigated by comparing its results with those generated by a finite-difference method which uses a Newton linearization scheme.

**MSC:**

**80M35** Asymptotic analysis for problems in thermodynamics and heat transfer

Cited in **22** Documents

**80M50** Optimization problems in thermodynamics and heat transfer

**Keywords:**

nonlinear differential equations; convective fin; optimization; Adomian decomposition method; convective rectangular fin

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