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Application of the two-dimensional differential transform method to heat conduction problem for heat transfer in longitudinal rectangular and convex parabolic fins. (English)

Zbl 1308.35046

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Summary: In this article, approximate analytical (series) solutions for the temperature distribution in a longitudinal rectangular and convex parabolic fins with temperature dependent thermal conductivity and heat transfer coefficient are derived. The transient heat conduction problem is solved for the first time using the two-dimensional differential transform method (2D DTM). The effects of some physical parameters such as the thermo-geometric parameter, exponent and thermal conductivity gradient on temperature distribution are studied. Furthermore, we study the temperature profile at the fin tip.

MSC:

35C05 Solutions to PDEs in closed form

35K59 Quasilinear parabolic equations

35Q79 PDEs in connection with classical thermodynamics and heat transfer

80A20 Heat and mass transfer, heat flow (MSC2010)

Cited in 4 Documents

Keywords:

two-dimensional DTM; analytical solutions; fins; rectangular and convex profiles; temperature dependent thermal properties

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