

A numerical approach for efficiency analysis of heat distribution through fin

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ABSTRACT

In this paper an analysis is carried out to study the efficiency of heat distribution through fins using finite element method (FEM) and differential quadrature method (DQM). Numerical solutions are obtained using both methods for temperature distribution over the fin surface. Analysis of surface solutions in terms of temperature and error distributions has been presented here. Solutions are also obtained using equally spaced (conventional) and non-equally spaced (optimum) mesh (nodal points) distribution techniques. Two-dimensional heat conduction problem has been solved in both equal and non-equal nodal points distribution cases (called here conventional FEM and DQM, optimum FEM and DQM respectively as CFEM and CDQM, OFEM and ODQM). The obtained results are compared and investigated with exact results. The best results are found in OFEM solutions. It is also found that, ODQM solutions reach very close to OFEM solutions with negligible error, whereas CFEM and CDQM solutions diverge with increasing number of nodal (mesh) points.

KEYWORDS

Differential quadrature method; Finite element method; Fin; Temperature distribution

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