

Comparison of optimum finite element method vs. differential quadrature method in two-dimensional heat transfer problem

ABSTRACT

Among various numerical solution techniques, finite element method (FEM) and differential quadrature method (DQM) are two important of those. Usually elements are sub-divided uniformly in FEM (conventional FEM, CFEM) to obtain temperature distribution behavior in a fin or plate. Hence, extra computational complexity is needed to obtain a fair solution with required accuracy. In this paper, non-uniform sub-elements are considered for FEM (optimum FEM, OFEM) solution to reduce the computational complexity. Then this OFEM is applied for the solution of two-dimensional heat transfer problem in a rectangular thin fin. The obtained results are compared with CFEM and optimum DQM (ODQM, with non-uniform mesh generation). It is found that the OFEM exhibit more accurate results than CFEM and ODQM showing its potentiality.

Keyword: Optimum finite element method; Optimum differential quadrature method; Heat transfer problem