

Fast transient solutions for heat transfer [FEM]

Abstract

The implementation of the finite element method (FEM) in thermal analysis usually produces a formulation in the space/time domain. This kind of space/time domain formulation leads to a set of ordinary differential equations which have to be solved in the time domain. However, the size of the equations or matrices in FEM usually are large, thus the conventional algorithms involve considerable computational time. The conventional methods have to take a very small time step size to avoid undesirable numerically induced oscillations or numerical instabilities. Thus, a new solution algorithm, named the asymptotic waveform evaluation (AWE) scheme, is introduced to solve for transient problems.

Keywords — Asymptotic waveform evaluation (AWE), Pade approximation, Zero input response (ZIR), Zero state response (ZSR)