ICM-9301-46 The PIER Parallel FEA Program Generator, Naveen Sharma.

ABSTRACT In this paper we briefly describe a combined symbolic-numeric approach for solving PDE-based mathematical models. An experimental software system, PIER, is being developed in `CL` to synthesize computation-intensive and problem formulation dependent phases of the FEA solution method. Quantities for domain formulation like shape functions, element stiffness matrices etc. are automatically derived using symbolic mathematical computations. The problem specifics and derived formulae are then used to generate sequential and parallel numerical code for FEA solution steps. A constructive approach to specify a numerical program design is taken. The code generator compiles application-oriented input specifications into `F77` subroutines with the help of built-in knowledge of the particular problem, numerical solution methods and the target computer. The parallelization is based upon the domain-independent analysis and domain-specific knowledge coded in the system.