

Multiple solvers for implicit temperature calculation of plate heat conduction with MPS method

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In this study, an implicit algorithm and different solvers for temperature calculation were used to reduce the computation time of a plate heat conduction. The method used is based on the Moving Particle Semi-Implicit(MPS) method. The original MPS method uses explicit method for temperature calculation and is limited by time increment due to diffusion number especially in some cases with high thermal diffusivity. In this paper, the heat conduction of plate with Dirichlet boundary condition and Neumann boundary condition are studied. Furthermore, we contrast with steady state and transient heat conduction. The calculation time and accuracy of explicit and implicit calculation of plate heat transfer cases are compared. In addition, different algorithms and existing solvers are used to calculate the implicit temperature equation, and the calculation time and accuracy of different algorithms and solvers are compared. Consequently, it is shown that the temperature obtained using implicit algorithm agrees well with that obtained using the original explicit algorithm and the steady state equation, the computation time of implicit algorithm is shorter than that of explicit algorithm. In addition, the coefficient matrix of implicit temperature calculation equation is similar to the Pressure Poisson Equation(PPE), the optimal solver can also be extended to the solution of PPE.