عنوان مقاله:

A truly meshless method formulation for analysis of non-Fourier heat conduction in solids

محل انتشار:

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خلاصه مقاله:

The non-Fourier effect in heat conduction is important in strong thermal environments and thermal shock problems. Generally, commercial FE codes are not available for analysis of non-Fourier heat conduction. In this study,a meshless formulation is presented for the analysis of the non-Fourier heat conduction in the materials. The formulation is based on the symmetric local weak form of the second-order non-Fourier heat conduction equation in termsof the temperature. Using the local weak form of heat transfer equations in the sub-domains, the governing equation of the non-Fourier heat conductionis discretized in the space domain to the second order ordinary differentialequations for the time. The discretized equations are integrated into the time domain with an appropriate finite difference method. The fictitious numericaloscillations are completely suppressed from the front of temperature waves in the presented method. An analytical series solution is developed for the non Fourier heat transfer in one-dimensional heat transfer for special boundaryconditions and the accuracy of presented numerical meshless method is validated by comparison of the results of the numerical meshless solution and the series solution. The numerical results are presented for non-Fourier heat conduction for various Vernotte numbers and boundary conditions and the .results are compared with the results of the classical Fourier heat conduction

کلمات کلیدی:

Meshless method, Non-fourier heat conduction, Temperature waves, Heat propagation, Analytical solution