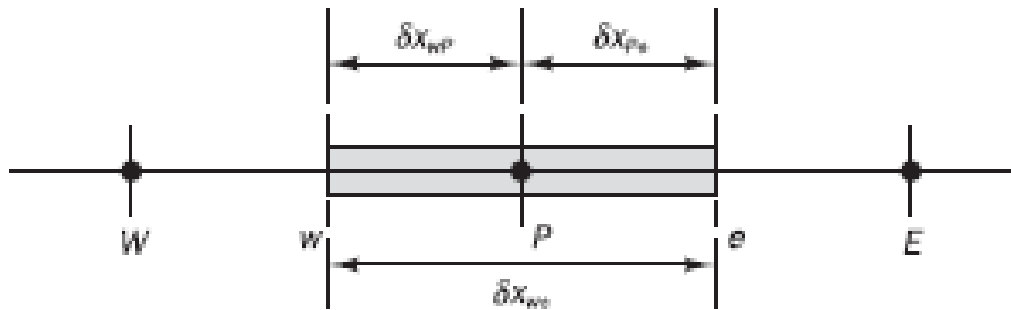


8.2 One-dimensional unsteady heat conduction



Example 8.1

A thin plate is initially at a uniform temperature of 200°C . At a certain time $t = 0$ the temperature of the east side of the plate is suddenly reduced to 0°C . The other surface is insulated. Use the explicit finite volume method in conjunction with a suitable time step size to calculate the transient temperature distribution of the slab and compare it with the analytical solution at time (i) $t = 40$ s, (ii) $t = 80$ s and (iii) $t = 120$ s. Recalculate the numerical solution using a time step size equal to the limit given by (8.13) for $t = 40$ s and compare the results with the analytical solution. The data are: plate thickness $L = 2$ cm, thermal conductivity $k = 10$ W/m.K and $\rho c = 10 \times 10^6$ J/m³.K.

