

One-dimensional transient heat transfer - Bar

REFERENCE The Standard NAFEMS Benchmarks, Rev. 3, NAFEMS, Glasgow, 1990

MODEL FILENAME 1D TTH bar.nfx

Figure 1 shows a one-dimensional transient heat transfer problem with conduction. A temperature of $0\text{ }^{\circ}\text{C}$ is assigned to the point A. A time variant temperature of $100\sin(\pi t / 40)$ is set to the point B. The initial temperature of $0\text{ }^{\circ}\text{C}$ is applied at all of the nodes. Transient heat transfer analysis is carried out with a fixed time step of 1 second. The temperature at the point C at time $t=32$ sec is obtained using various finite elements. The solution from the NAFEMS benchmarks is taken as a reference for comparison.

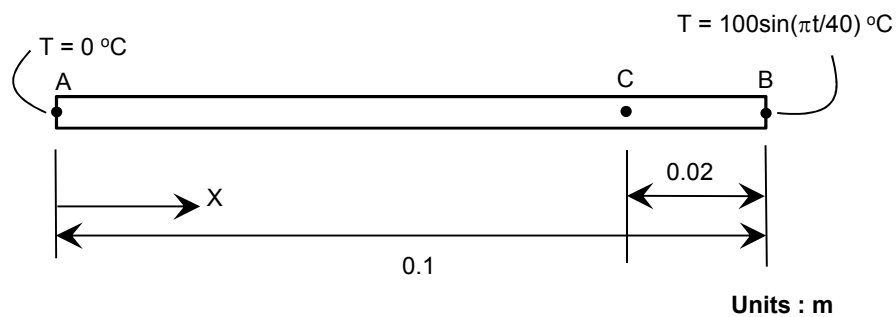


Figure 1. One-dimensional transient heat transfer problem

Material data	Conductivity	$k = 35.0\text{ W/m}\cdot^{\circ}\text{C}$
	Specific heat	$C = 440.5\text{ J/kg}\cdot^{\circ}\text{C}$
	Density	$\rho = 7200\text{ kg/m}^3$

Table 1. Temperature at point C obtained using bar element

		$T_C\text{ [}^{\circ}\text{C]}$
Reference		36.60
Element type	Number of elements	
BAR-2	10	35.51