14.71   MASS71 — Thermal Mass
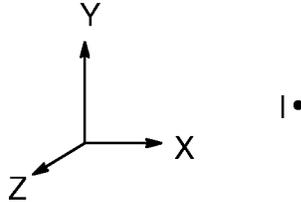
Matrix Or Vector	Shape Functions	Integration Points
Specific Heat Matrix	None	None
Heat Generation Load Vector	None	None

14.71.1   Specific Heat Matrix

The specific heat matrix for this element is simply:

$$\left[C_e^t \right] = \left[C^o \right] \tag{14.71-1}$$

C^o is defined as:

$$C^o = \begin{cases} \varrho C_p \, (\text{vol}) & \text{if KEYOPT(3)} = 0 \\ \\ C_a & \text{if KEYOPT(3)} = 1 \end{cases} \tag{14.71-2}$$

where: ϱ =   density (input as DENS on **MP** command)
                    C_p =   specific heat (input as C on **MP** command)
                    vol   =   volume (input as CONI on **R** command)
                    C_a =   capacitance (input as CONI on **R** command)

14.71.2   Heat Generation Load Vector

The heat generation load vector is:

$$\{Q_c^g\} = \{A_q\}$$

(14.71–3)

where: A_q =

$$\begin{cases} Q_R & \text{if } A_1 \text{ thru } A_6 \text{ are not provided} \\ \text{or} \\ A_1 + A_2T + A_3T^{A_4} + A_5T^{A_6} & \text{if } A_1 \text{ thru } A_6 \text{ are provided} \end{cases}$$

Q_R = heat rate (input quantity QRATE on **MP** command)

$A_1, A_2,$ etc. = input quantities A1, A2, etc. on **R** command

T = $T_\ell + T_o$ = absolute temperature

$$T_\ell = \begin{cases} T_{unif} \text{ for first iteration} \\ \\ T'_\ell \text{ for second and subsequent iterations} \end{cases}$$

T_{unif} = input on **BFUNIF** command

T'_ℓ = temperature from previous iteration

T_o = offset temperature (input on **TOFFST** command)