TJ-33 机电特性矩阵

刚度系数矩阵

$$\begin{pmatrix} C_{11} & C_{12} & C_{13} & 0 & 0 & 0 \\ C_{12} & C_{11} & C_{13} & 0 & 0 & 0 \\ C_{13} & C_{13} & C_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & C_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & C_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & C_{66} \end{pmatrix}^{E} = \begin{pmatrix} 18.4 & 6.3 & 6.4 & 0 & 0 & 0 \\ 6.3 & 18.4 & 6.4 & 0 & 0 & 0 \\ 6.4 & 6.4 & 12.6 & 0 & 0 & 0 \\ 0 & 0 & 0 & 3.8 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3.8 & 0 \\ 0 & 0 & 0 & 0 & 0 & 6.0 \end{pmatrix}^{E} 10^{10} N/m^2$$

$$\begin{pmatrix} C_{11} & C_{12} & C_{13} & 0 & 0 & 0 \\ C_{12} & C_{11} & C_{13} & 0 & 0 & 0 \\ C_{13} & C_{13} & C_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & C_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & C_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & C_{66} \end{pmatrix}^{D} = \begin{pmatrix} 18.9 & 6.9 & 8.1 & 0 & 0 & 0 \\ 6.9 & 18.9 & 8.1 & 0 & 0 & 0 \\ 8.1 & 8.1 & 17.1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 4.0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 4.0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 6.0 \end{pmatrix}^{D} 10^{10} N/m^2$$

弹性柔顺系数矩阵

$$\begin{pmatrix} S_{11} & S_{12} & S_{13} & 0 & 0 & 0 \\ S_{12} & S_{11} & S_{13} & 0 & 0 & 0 \\ S_{13} & S_{13} & S_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & S_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & S_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & S_{66} \end{pmatrix}^{E} = \begin{pmatrix} 6.9 & -1.4 & -2.8 & 0 & 0 & 0 \\ -1.4 & 6.9 & -2.8 & 0 & 0 & 0 \\ -2.8 & -2.8 & 10.8 & 0 & 0 & 0 \\ 0 & 0 & 0 & 26.6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 26.6 & 0 \\ 0 & 0 & 0 & 0 & 0 & 16.6 \end{pmatrix}^{E} 10^{-12} m^2/N$$

$$\begin{pmatrix} S_{11} & S_{12} & S_{13} & 0 & 0 & 0 \\ S_{12} & S_{11} & S_{13} & 0 & 0 & 0 \\ S_{13} & S_{13} & S_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & S_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & S_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & S_{66} \end{pmatrix}^{D} = \begin{pmatrix} 6.9 & -1.4 & -2.6 & 0 & 0 & 0 \\ -1.4 & 6.9 & -2.6 & 0 & 0 & 0 \\ -2.6 & -2.6 & 8.3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 24.8 & 0 & 0 \\ 0 & 0 & 0 & 0 & 24.8 & 0 \\ 0 & 0 & 0 & 0 & 0 & 16.6 \end{pmatrix}^{D} 10^{-12} m^2/N$$

受夹介电常数矩阵

$$\begin{pmatrix} \varepsilon_{11} & 0 & 0 \\ 0 & \varepsilon_{11} & 0 \\ 0 & 0 & \varepsilon_{33} \end{pmatrix}^{S} = \begin{pmatrix} 245 & 0 & 0 \\ 0 & 245 & 0 \\ 0 & 0 & 140 \end{pmatrix}^{S}$$

自由介电常数矩阵

$$\begin{pmatrix} \varepsilon_{11} & 0 & 0 \\ 0 & \varepsilon_{11} & 0 \\ 0 & 0 & \varepsilon_{33} \end{pmatrix}^{T} = \begin{pmatrix} 265 & 0 & 0 \\ 0 & 265 & 0 \\ 0 & 0 & 175 \end{pmatrix}^{T}$$

压电常数矩阵

$$\begin{pmatrix} 0 & 0 & 0 & 0 & d_{15} & 0 \\ 0 & 0 & 0 & d_{24} & 0 & 0 \\ d_{31} & d_{31} & d_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 65 & 0 \\ 0 & 0 & 0 & 65 & 0 & 0 \\ -5.9 & -5.9 & 62 & 0 & 0 & 0 \end{pmatrix} 10^{-12} C/N$$

$$\begin{pmatrix} 0 & 0 & 0 & 0 & g_{15} & 0 \\ 0 & 0 & 0 & g_{24} & 0 & 0 \\ g_{31} & g_{31} & g_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 27.7 & 0 \\ 0 & 0 & 0 & 27.7 & 0 & 0 \\ -3.8 & -3.8 & 40.0 & 0 & 0 & 0 \end{pmatrix} 10^{-3} Vm/N$$

$$\begin{pmatrix} 0 & 0 & 0 & 0 & e_{15} & 0 \\ 0 & 0 & 0 & e_{24} & 0 & 0 \\ e_{31} & e_{31} & e_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 2.5 & 0 \\ 0 & 0 & 0 & 2.5 & 0 & 0 \\ -2.5 & -2.5 & 7.1 & 0 & 0 & 0 \end{pmatrix} C/m^{2}$$

$$\begin{pmatrix} 0 & 0 & 0 & 0 & h_{15} & 0 \\ 0 & 0 & 0 & h_{24} & 0 & 0 \\ h_{31} & h_{31} & h_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 11.1 & 0 \\ 0 & 0 & 0 & 11.1 & 0 & 0 \\ -22.6 & -22.6 & 62.2 & 0 & 0 & 0 \end{pmatrix} 10^{8} V/m$$