TJ-51 机电特性矩阵

刚度系数矩阵

$$\begin{pmatrix} C_{11} & C_{12} & C_{13} & 0 & 0 & 0 \\ C_{12} & C_{11} & C_{13} & 0 & 0 & 0 \\ C_{13} & C_{13} & C_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & C_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & C_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & C_{66} \end{pmatrix}^E = \begin{pmatrix} 13.5 & 8.6 & 8.8 & 0 & 0 & 0 \\ 8.6 & 13.5 & 8.8 & 0 & 0 & 0 \\ 8.8 & 8.8 & 12.0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2.2 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2.2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2.5 \end{pmatrix}^E 10^{10}N/m^2$$

$$\begin{pmatrix} C_{11} & C_{12} & C_{13} & 0 & 0 & 0 \\ C_{12} & C_{11} & C_{13} & 0 & 0 & 0 \\ C_{13} & C_{13} & C_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & C_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & C_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & C_{66} \end{pmatrix}^D = \begin{pmatrix} 14.0 & 9.1 & 7.7 & 0 & 0 & 0 \\ 9.1 & 14.0 & 7.7 & 0 & 0 & 0 \\ 7.7 & 7.7 & 15.9 & 0 & 0 & 0 \\ 0 & 0 & 0 & 4.5 & 0 & 0 \\ 0 & 0 & 0 & 0 & 4.5 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2.5 \end{pmatrix}^D 10^{10}N/m^2$$

弹性柔顺系数矩阵

$$\begin{pmatrix} S_{11} & S_{12} & S_{13} & 0 & 0 & 0 \\ S_{12} & S_{11} & S_{13} & 0 & 0 & 0 \\ S_{13} & S_{13} & S_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & S_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & S_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & S_{66} \end{pmatrix}^E = \begin{pmatrix} 15.5 & -4.7 & -7.9 & 0 & 0 & 0 \\ -4.7 & 15.5 & -7.9 & 0 & 0 & 0 \\ -7.9 & -7.9 & 19.9 & 0 & 0 & 0 \\ 0 & 0 & 0 & 45.1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 45.1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 40.4 \end{pmatrix}^E 10^{-12}m^2/N$$

$$\begin{pmatrix} S_{11} & S_{12} & S_{13} & 0 & 0 & 0 \\ S_{12} & S_{11} & S_{13} & 0 & 0 & 0 \\ S_{13} & S_{13} & S_{33} & 0 & 0 & 0 \\ 0 & 0 & 0 & S_{44} & 0 & 0 \\ 0 & 0 & 0 & 0 & S_{55} & 0 \\ 0 & 0 & 0 & 0 & 0 & S_{66} \end{pmatrix}^D = \begin{pmatrix} 13.3 & -6.9 & -3.1 & 0 & 0 & 0 \\ -6.9 & 13.3 & -3.1 & 0 & 0 & 0 \\ -3.1 & -3.1 & 9.3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 22.4 & 0 & 0 \\ 0 & 0 & 0 & 0 & 22.4 & 0 \\ 0 & 0 & 0 & 0 & 0 & 40.4 \end{pmatrix}^D 10^{-12}m^2/N$$

受夹介电常数矩阵

$$
\begin{pmatrix} \varepsilon_{11} & 0 & 0 \\ 0 & \varepsilon_{11} & 0 \\ 0 & 0 & \varepsilon_{33} \end{pmatrix}^{S} = \begin{pmatrix} 1155 & 0 & 0 \\ 0 & 1155 & 0 \\ 0 & 0 & 980 \end{pmatrix}^{S}
$$

自由介电常数矩阵

$$
\begin{pmatrix} \varepsilon_{11} & 0 & 0 \\ 0 & \varepsilon_{11} & 0 \\ 0 & 0 & \varepsilon_{33} \end{pmatrix}^{T} = \begin{pmatrix} 2330 & 0 & 0 \\ 0 & 2330 & 0 \\ 0 & 0 & 2250 \end{pmatrix}^{T}
$$

压电常数矩阵

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & d_{15} & 0 \\ 0 & 0 & 0 & d_{24} & 0 & 0 \\ d_{31} & d_{31} & d_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 685 & 0 \\ 0 & 0 & 0 & 685 & 0 & 0 \\ -210 & -210 & 460 & 0 & 0 & 0 \end{pmatrix} 10^{-12} C/N
$$

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & g_{15} & 0 \\ 0 & 0 & 0 & g_{24} & 0 & 0 \\ g_{31} & g_{31} & g_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 33.2 & 0 \\ 0 & 0 & 0 & 33.2 & 0 & 0 \\ -10.5 & -10.5 & 23.1 & 0 & 0 & 0 \end{pmatrix} 10^{-3} Vm/N
$$

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & e_{15} & 0 \\ 0 & 0 & 0 & e_{24} & 0 & 0 \\ e_{31} & e_{31} & e_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 15.1 & 0 \\ 0 & 0 & 0 & 15.1 & 0 & 0 \\ -5.9 & -5.9 & 18.2 & 0 & 0 & 0 \end{pmatrix} C/m^{2}
$$

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & h_{15} & 0 \\ 0 & 0 & 0 & h_{24} & 0 & 0 \\ h_{31} & h_{31} & h_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 14.9 & 0 \\ 0 & 0 & 0 & 14.9 & 0 & 0 \\ -6.5 & -6.5 & 20.6 & 0 & 0 & 0 \end{pmatrix} 10^{8} V/m
$$