TJ-20 机电特性矩阵

刚度系数矩阵

$$
\begin{pmatrix}
C_{11} & C_{12} & C_{13} & 0 & 0 & 0 \\
C_{12} & C_{11} & C_{13} & 0 & 0 & 0 \\
C_{13} & C_{13} & C_{33} & 0 & 0 & 0 \\
0 & 0 & 0 & C_{44} & 0 & 0 \\
0 & 0 & 0 & 0 & C_{55} & 0 \\
0 & 0 & 0 & 0 & 0 & C_{66}
\end{pmatrix}^{E}
=
\begin{pmatrix}
17.0 & 5.6 & 5.8 & 0 & 0 & 0 \\
5.6 & 17.0 & 5.8 & 0 & 0 & 0 \\
5.8 & 5.8 & 12.4 & 0 & 0 & 0 \\
0 & 0 & 0 & 5.2 & 0 & 0 \\
0 & 0 & 0 & 0 & 5.2 & 0 \\
0 & 0 & 0 & 0 & 0 & 5.7
\end{pmatrix}^{E}
10^{10} N/m^2
$$

$$
\begin{pmatrix}
C_{11} & C_{12} & C_{13} & 0 & 0 & 0 \\
C_{12} & C_{11} & C_{13} & 0 & 0 & 0 \\
C_{13} & C_{13} & C_{33} & 0 & 0 & 0 \\
0 & 0 & 0 & C_{44} & 0 & 0 \\
0 & 0 & 0 & 0 & C_{55} & 0 \\
0 & 0 & 0 & 0 & 0 & C_{66}
\end{pmatrix}^{D}
=
\begin{pmatrix}
18.0 & 6.7 & 8.3 & 0 & 0 & 0 \\
6.7 & 18.0 & 8.3 & 0 & 0 & 0 \\
8.3 & 8.3 & 18.6 & 0 & 0 & 0 \\
0 & 0 & 0 & 5.8 & 0 & 0 \\
0 & 0 & 0 & 0 & 5.8 & 0 \\
0 & 0 & 0 & 0 & 0 & 5.7
\end{pmatrix}^{D}
10^{10} N/m^2
$$

弹性柔顺系数矩阵

$$
\begin{pmatrix}
S_{11} & S_{12} & S_{13} & 0 & 0 & 0 \\
S_{12} & S_{11} & S_{13} & 0 & 0 & 0 \\
S_{13} & S_{13} & S_{33} & 0 & 0 & 0 \\
0 & 0 & 0 & S_{44} & 0 & 0 \\
0 & 0 & 0 & 0 & S_{55} & 0 \\
0 & 0 & 0 & 0 & 0 & S_{66}
\end{pmatrix}^{E}
=
\begin{pmatrix}
7.3 & -1.5 & -2.7 & 0 & 0 & 0 \\
-1.5 & 7.3 & -2.7 & 0 & 0 & 0 \\
-2.7 & -2.7 & 10.6 & 0 & 0 & 0 \\
0 & 0 & 0 & 19.4 & 0 & 0 \\
0 & 0 & 0 & 0 & 19.4 & 0 \\
0 & 0 & 0 & 0 & 0 & 17.6
\end{pmatrix}^{E}
10^{-12} m^2/N
$$

$$
\begin{pmatrix}
S_{11} & S_{12} & S_{13} & 0 & 0 & 0 \\
S_{12} & S_{11} & S_{13} & 0 & 0 & 0 \\
S_{13} & S_{13} & S_{33} & 0 & 0 & 0 \\
0 & 0 & 0 & S_{44} & 0 & 0 \\
0 & 0 & 0 & 0 & S_{55} & 0 \\
0 & 0 & 0 & 0 & 0 & S_{66}
\end{pmatrix}^{D}
=
\begin{pmatrix}
7.3 & -1.5 & -2.6 & 0 & 0 & 0 \\
-1.5 & 7.3 & -2.6 & 0 & 0 & 0 \\
-2.6 & -2.6 & 7.7 & 0 & 0 & 0 \\
0 & 0 & 0 & 17.4 & 0 & 0 \\
0 & 0 & 0 & 0 & 17.4 & 0 \\
0 & 0 & 0 & 0 & 0 & 17.6
\end{pmatrix}^{D}
10^{-12} m^2/N
$$

受夹介电常数矩阵

$$
\begin{pmatrix} \varepsilon_{11} & 0 & 0 \\ 0 & \varepsilon_{11} & 0 \\ 0 & 0 & \varepsilon_{33} \end{pmatrix}^{S} = \begin{pmatrix} 215 & 0 & 0 \\ 0 & 215 & 0 \\ 0 & 0 & 150 \end{pmatrix}^{S}
$$

自由介电常数矩阵

$$
\begin{pmatrix} \varepsilon_{11} & 0 & 0 \\ 0 & \varepsilon_{11} & 0 \\ 0 & 0 & \varepsilon_{33} \end{pmatrix}^{T} = \begin{pmatrix} 240 & 0 & 0 \\ 0 & 240 & 0 \\ 0 & 0 & 205 \end{pmatrix}^{T}
$$

压电常数矩阵

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & d_{15} & 0 \\ 0 & 0 & 0 & d_{24} & 0 & 0 \\ d_{31} & d_{31} & d_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 65.0 & 0 \\ 0 & 0 & 0 & 65.0 & 0 & 0 \\ -3.7 & -3.7 & 72.0 & 0 & 0 & 0 \end{pmatrix} 10^{-12} C/N
$$

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & g_{15} & 0 \\ 0 & 0 & 0 & g_{24} & 0 & 0 \\ g_{31} & g_{31} & g_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 30.6 & 0 \\ 0 & 0 & 0 & 30.6 & 0 & 0 \\ -2.0 & -2.0 & 40.0 & 0 & 0 & 0 \end{pmatrix} 10^{-3} Vm/N
$$

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & e_{15} & 0 \\ 0 & 0 & 0 & e_{24} & 0 & 0 \\ e_{31} & e_{31} & e_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 3.4 & 0 \\ 0 & 0 & 0 & 3.4 & 0 & 0 \\ -3.3 & -3.3 & 8.5 & 0 & 0 & 0 \end{pmatrix} C/m^{2}
$$

$$
\begin{pmatrix} 0 & 0 & 0 & 0 & h_{15} & 0 \\ 0 & 0 & 0 & h_{24} & 0 & 0 \\ h_{31} & h_{31} & h_{33} & 0 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 & 17.4 & 0 \\ 0 & 0 & 0 & 17.4 & 0 & 0 \\ -28.3 & -28.3 & 71.1 & 0 & 0 & 0 \end{pmatrix} 10^{8} V/m
$$