The sequence of the corresponding inverse matrices is reversed. Specifically, the product of transformation matrices is transformed by

\[ G' = P'G \]

with \( P' \) the transposed matrix of \( P \), i.e. rows and columns of \( P \) are interchanged. Specifically,

\[ G = P_1P_2\cdots P_n \]

the sequence of the corresponding inverse matrices \( P_i \) is reversed in the product

\[ P = P_1^{-1}P_2^{-1}\cdots P_n^{-1} \]

The following items are also affected by a transformation:

(i) The metric matrix of direct lattice \( G \) [more exactly: the matrix of geometrical coefficients (metric tensor)] is transformed by the matrix \( P \) as follows:

\[ G' = P'GP \]

(ii) The metric matrix of reciprocal lattice \( G^* \) [more exactly: the matrix of geometrical coefficients (metric tensor)] is transformed by

\[ G'' = QG^*Q' \]

Here, the transposed matrix \( Q' \) is on the right-hand side of \( G' \).

(iii) The volume of the unit cell \( V \) changes with the transformation. The volume of the new unit cell \( V' \) is obtained by

\[ V' = \det(P)V = \begin{vmatrix} P_{11} & P_{12} & P_{13} \\ P_{21} & P_{22} & P_{23} \\ P_{31} & P_{32} & P_{33} \end{vmatrix} V \]

with \( \det(P) \) the determinant of the matrix \( P \). The corresponding equation for the volume of the unit cell in reciprocal space \( V^* \) is

\[ V'' = \det(Q)V' \]

Matrices \( P \) and \( Q \) that frequently occur in crystallography are listed in Table 5.1.3.1.