It is observed from frequent experimentation has shown that drawing—pulling identical bars from steel and rubber by the same axial force and consequently, thus the same axial stress, results of stress in different elongations from these two bars. This material In mechanics, the difference the two bars in mechanical—the materials of the two bars is represented by the relationship between the components of stress and the-strain. By the writing expressing each of these like a column matrix of column, i.e.,

\[
\{\rho\}^T = \begin{bmatrix} \rho_{12} & \rho_{22} & \rho_{32} & \rho_{33} \end{bmatrix}
\]

(1)

\[
\{d\}^T = \begin{bmatrix} d_{11} & d_{22} & d_{33} & d_{32} & d_{33} \end{bmatrix}
\]

(2)

we obtain

\[
\{\rho\} = [X]\{d\} \text{ or } \rho_{\beta} = X_{\alpha\beta}d_{\alpha}, \alpha, \beta = 1,2,3,4,5.
\]

(3)

where \(X\) is a 5 \(\times\) 5 matrix that characterizes the material of the body, and is generally called known as the matrix of elasticity and matrix its components elasticity are called elasticities or elastic constants of elasticity for the material of the body. Note that The shear strains have been multiplied by 2 in eqn. Eq. (2); the definitions (1) and (2) make ensure that \(\rho_{\beta}d_{\beta} = \rho_{\alpha}d_{\alpha}\). The equation (3), in other words, the relation between the stresses and strains shown in two Eq. (3) is called known as the relation constitutive relation for the material of the body. It is assumed in Eq. (3) that the body is stress-free in the reference configuration of reference from which the strain \(d\) is measured.