Matriz de Rigidez en Coordenadas Globales de una Barra de Pórtico Plano

$$S_1^{L} = \begin{vmatrix} \frac{E\times A}{L} & 0 & 0 & \frac{-E\times A}{L} & 0 & 0 \\ 0 & \frac{12E\times I}{L^3} & \frac{6E\times I}{L^2} & 0 & \frac{-12E\times I}{L^3} & \frac{6E\times I}{L^2} \\ 0 & \frac{6E\times I}{L^2} & \frac{4E\times I}{L} & 0 & \frac{-6E\times I}{L^2} & \frac{2E\times I}{L} \\ \frac{-E\times A}{L} & 0 & 0 & \frac{E\times A}{L} & 0 & 0 \\ 0 & \frac{-12E\times I}{L^3} & \frac{-6E\times I}{L^2} & 0 & \frac{12E\times I}{L^3} & \frac{-6E\times I}{L^2} \\ 0 & \frac{6E\times I}{L^2} & \frac{2E\times I}{L} & 0 & \frac{-6E\times I}{L^2} & \frac{4E\times I}{L} \end{vmatrix} \qquad RT = \begin{vmatrix} C & S & 0 & 0 & 0 & 0 \\ -S & C & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & C & S & 0 \\ 0 & 0 & 0 & -S & C & 0 \end{vmatrix}$$

$$RT^{T} = \begin{vmatrix} C & -S & 0 & 0 & 0 & 0 \\ S & C & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & C & -S & 0 \\ 0 & 0 & 0 & S & C & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{vmatrix} \qquad \begin{vmatrix} E\,A\,c / L & E\,A\,s / L & 0 & -E\,A\,c / L & -E\,A\,s / L & 0 \\ -12E\,I\,s / L^3 & 12E\,I\,c / L^3 & 6E\,I / L^2 & 12E\,I\,s / L^3 & -12E\,I\,c / L^3 & 6E\,I / L^2 \\ -6E\,Is / L^2 & 6E\,Ic / L^2 & 4E\,I / L & 6E\,I\,s / L^2 & -6E\,I\,c / L^2 & 2E\,I / L \\ -E\,A\,c / L & -E\,A\,s / L & 0 & E\,A\,c / L & E\,A\,s / L & 0 \\ 12E\,I\,s / L^3 & -12E\,I\,c / L^3 & -6E\,I / L^2 & -12E\,I\,s / L^3 & 12E\,I\,c / L^3 & -6E\,I / L^2 \\ -6E\,I\,s / L^2 & 6E\,I\,c / L^2 & 2E\,I / L & 6E\,I\,s / L^2 & -6E\,I\,c / L^2 & 4E\,I / L \end{vmatrix}$$

$$S_1 = \begin{vmatrix} \left(\frac{E\times Ac^2}{L}+\frac{12E\times Is^2}{L^3}\right) & \left(\frac{E\times Acs}{L}-\frac{12E\times Ics}{L^3}\right) & \frac{-6E\times Is}{L^2} & \left(\frac{-E\times Ac^2}{L}-\frac{12E\times Is^2}{L^3}\right) & \left(\frac{-E\times Acs}{L}+\frac{12E\times Ics}{L^3}\right) & \frac{-6E\times Is}{L^2} \\ \left(\frac{E\times Acs}{L}-\frac{12E\times Ics}{L^3}\right) & \left(\frac{E\times As^2}{L}+\frac{12E\times Ic^2}{L^3}\right) & \frac{6E\times Ic}{L^2} & \left(\frac{-E\times Acs}{L}+\frac{12E\times Ics}{L^3}\right) & \left(\frac{-E\times As^2}{L}-\frac{12E\times Ic^2}{L^3}\right) & \frac{6E\times Ic}{L^2} \\ \frac{-6E\times Is}{L^2} & \frac{6E\times Ic}{L^2} & \frac{4E\times I}{L} & \frac{6E\times Is}{L^2} & \frac{-6E\times Ic}{L^2} & \frac{2E\times I}{L} \\ \left(\frac{-E\times Ac^2}{L}-\frac{12E\times Is^2}{L^3}\right) & \left(\frac{-E\times Acs}{L}+\frac{12E\times Ics}{L^3}\right) & \frac{6E\times Is}{L^2} & \left(\frac{E\times Ac^2}{L}+\frac{12E\times Is^2}{L^3}\right) & \left(\frac{E\times Acs}{L}-\frac{12E\times Ics}{L^3}\right) & \frac{6E\times Is}{L^2} \\ \left(\frac{-E\times Acs}{L}+\frac{12E\times Ics}{L^3}\right) & \left(\frac{-E\times As^2}{L}-\frac{12E\times Ic^2}{L^3}\right) & \frac{-6E\times Ic}{L^2} & \left(\frac{E\times Acs}{L}-\frac{12E\times Ics}{L^3}\right) & \left(\frac{E\times As^2}{L}+\frac{12E\times Ic^2}{L^3}\right) & \frac{-6E\times Ic}{L^2} \\ \frac{-6E\times Is}{L^2} & \frac{6E\times Ic}{L^2} & \frac{2E\times I}{L} & \frac{6E\times Is}{L^2} & \frac{-6E\times Ic}{L^2} & \frac{4E\times I}{L} \end{vmatrix}$$