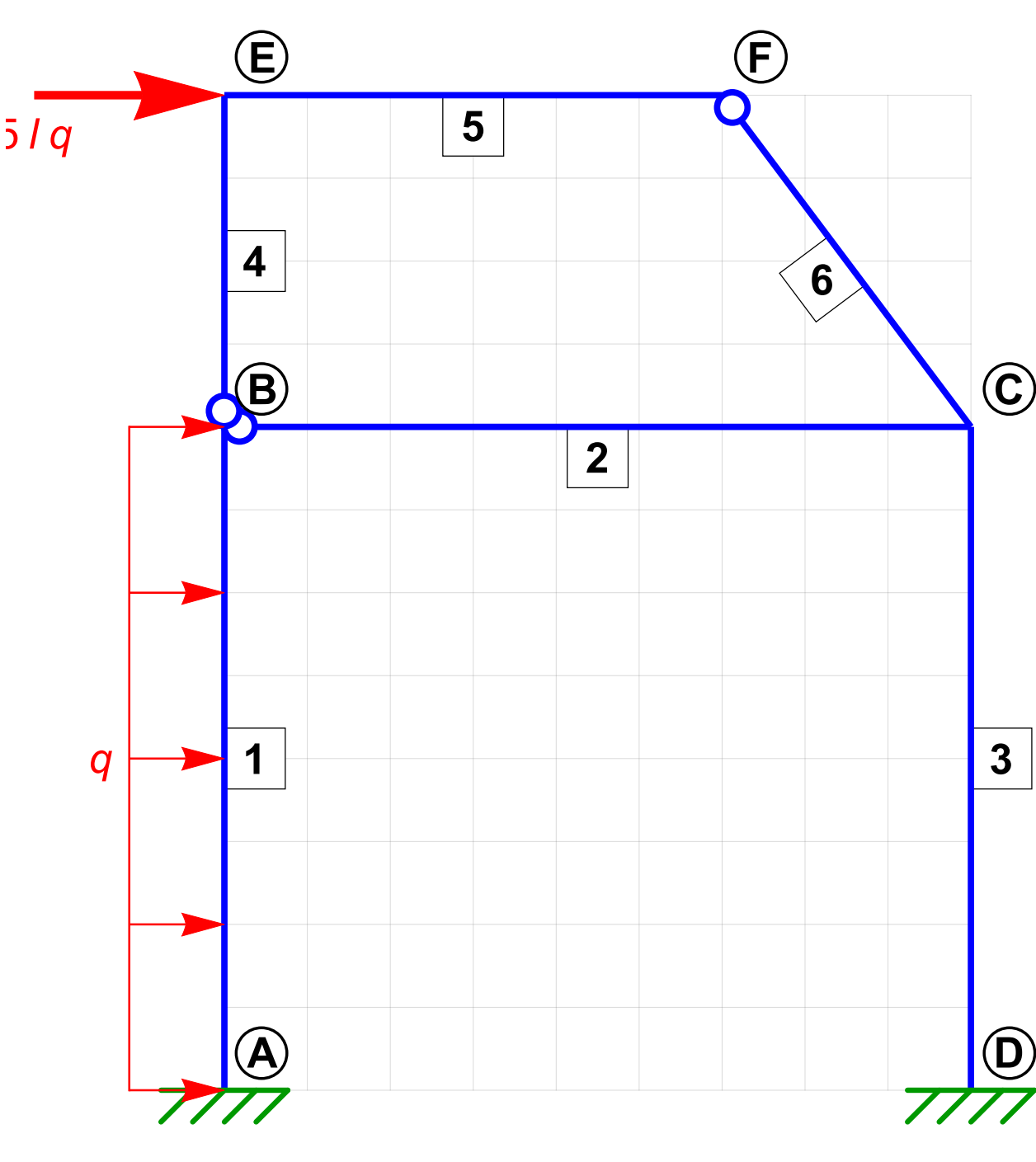


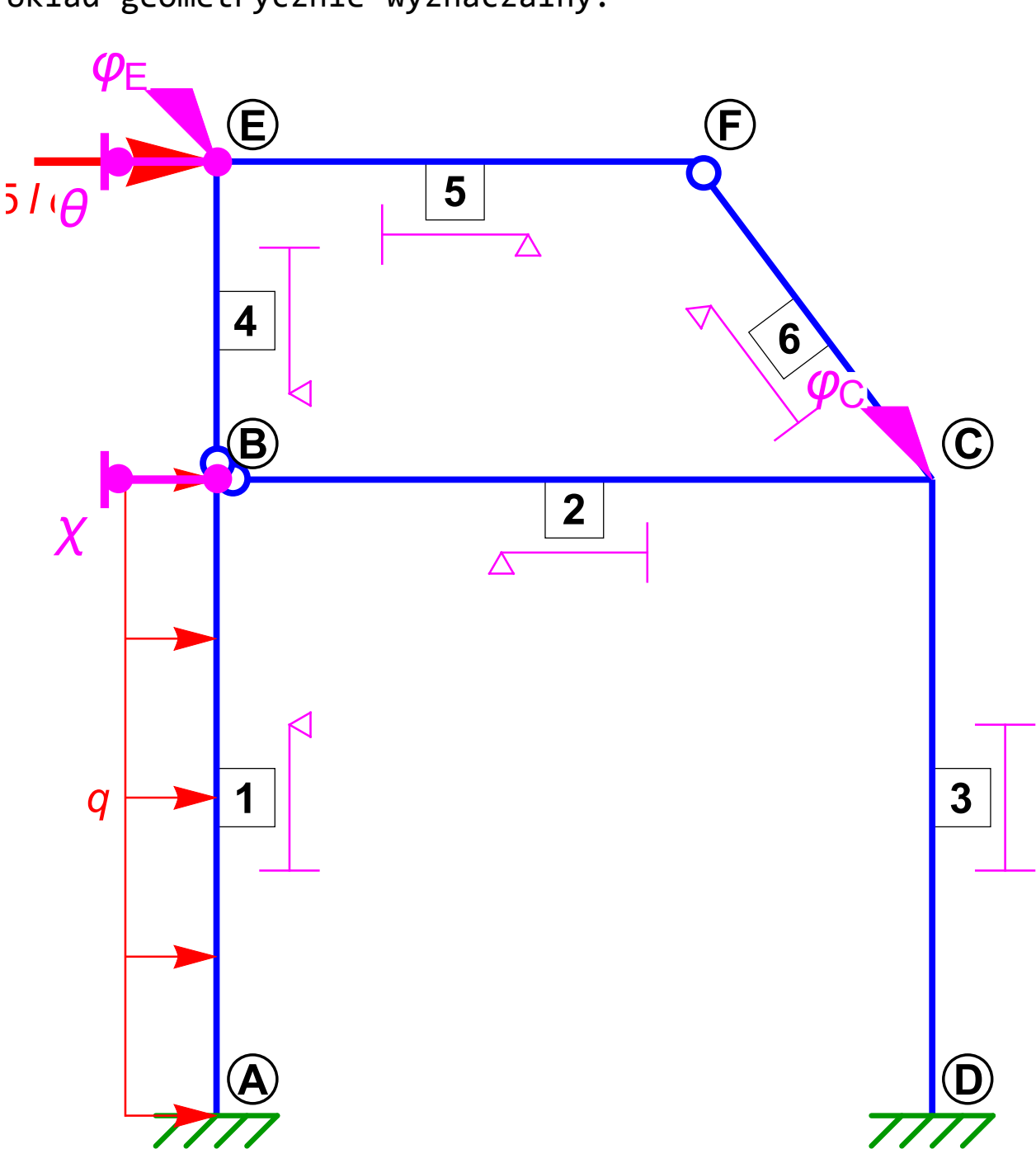
Geometria oraz obciążenia konstrukcji (wymiar oczka siatki - 1):



Wektor niewiadomych:

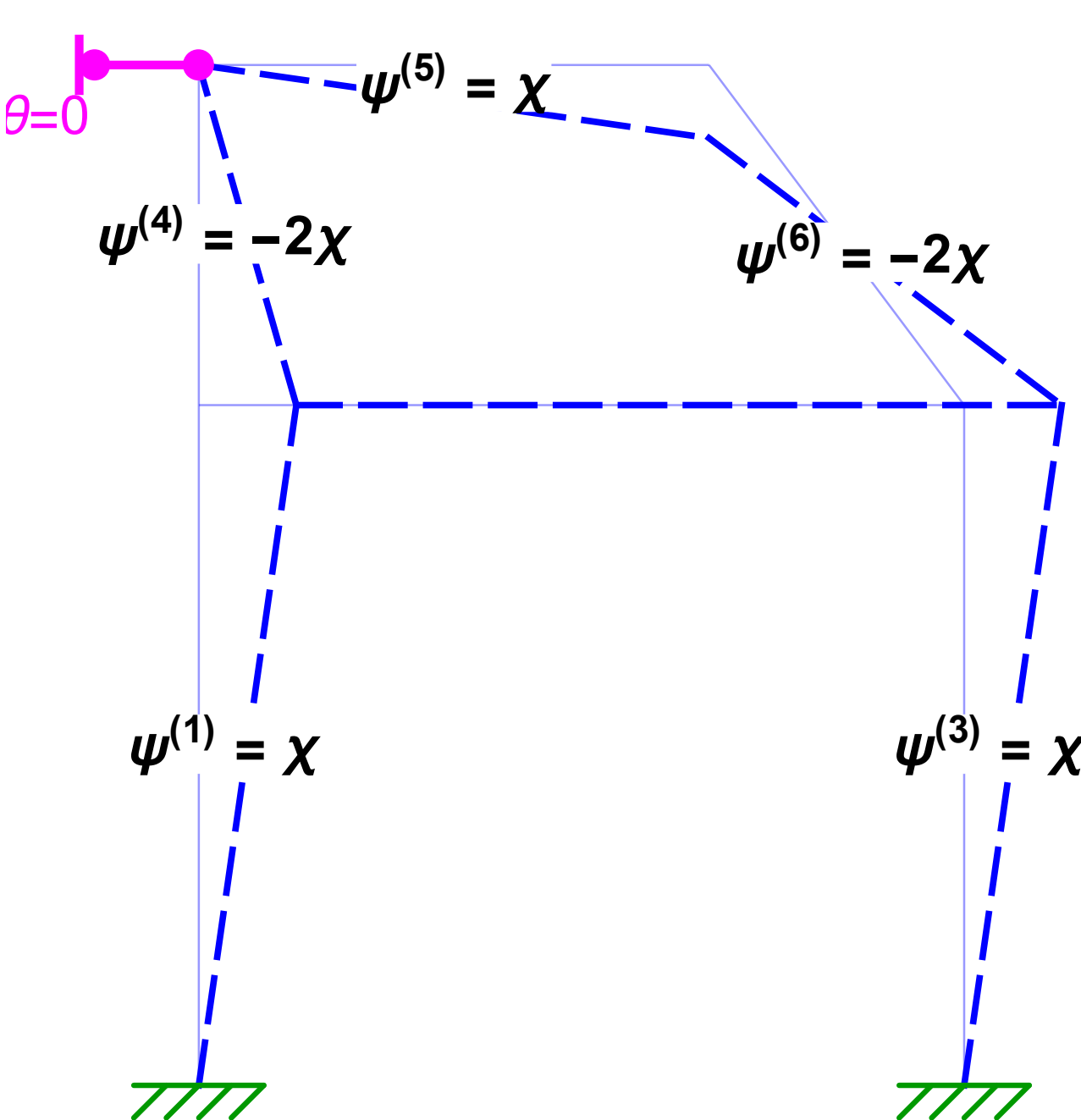
$$\mathbf{q} = \begin{pmatrix} \varphi_E \\ \varphi_C \\ \chi \\ \theta \end{pmatrix}$$

Układ geometrycznie wyznaczalny:

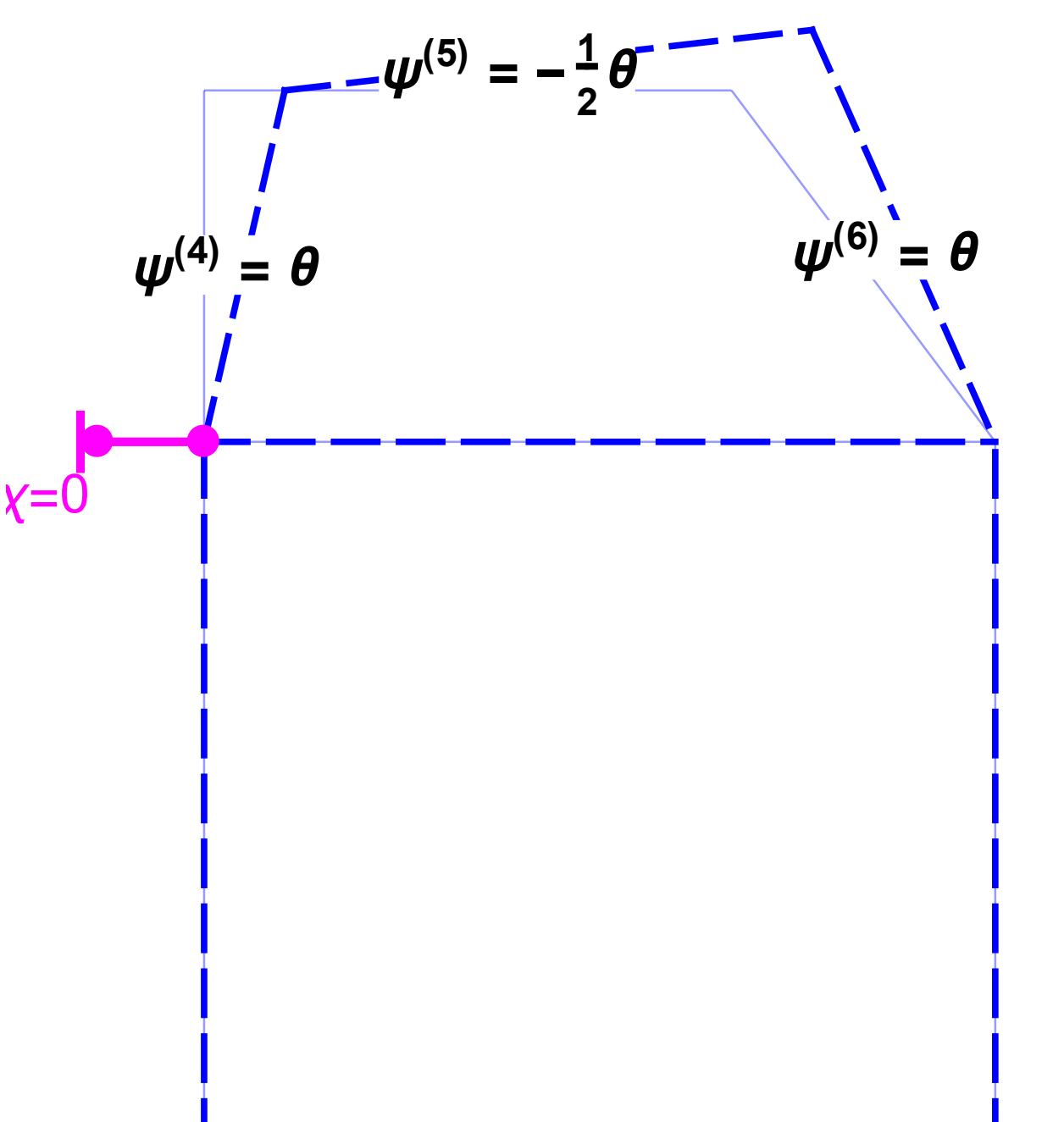


Plany przemieszczeń:

- plan przemieszczeń χ :



- plan przemieszczeń θ :



Ostateczny plan przemieszczeń:

$$\begin{aligned} \psi^{(1)} &= \chi \\ \psi^{(2)} &= 0 \\ \psi^{(3)} &= \chi \\ \psi^{(4)} &= -2\chi + \theta \\ \psi^{(5)} &= \chi - \frac{1}{2}\theta \\ \psi^{(6)} &= -2\chi + \theta \end{aligned}$$

Momenty wyjściowe:

$$\Phi_A^{01} = -8l^2q$$

Wzory transformacyjne:

$$\begin{aligned} \Phi_A^1 &= \frac{EJ}{1} \left[-\frac{3}{8}\chi \right] - 8l^2q \\ \Phi_C^2 &= \frac{EJ}{1} \left[\frac{1}{3}\varphi_C \right] \\ \Phi_D^3 &= \frac{EJ}{1} \left[\frac{1}{4}\varphi_C - \frac{3}{4}\chi \right] \\ \Phi_C^3 &= \frac{EJ}{1} \left[\frac{1}{2}\varphi_C - \frac{3}{4}\chi \right] \\ \Phi_E^4 &= \frac{EJ}{1} \left[\frac{3}{4}\varphi_E + \frac{3}{2}\chi - \frac{3}{4}\theta \right] \\ \Phi_E^5 &= \frac{EJ}{1} \left[\frac{1}{2}\varphi_E - \frac{1}{2}\chi + \frac{1}{4}\theta \right] \\ \Phi_C^6 &= \frac{EJ}{1} \left[\frac{3}{5}\varphi_C + \frac{6}{5}\chi - \frac{3}{5}\theta \right] \end{aligned}$$

Równania równowagi:

$$\begin{aligned} \Phi_E^4 + \Phi_E^5 &= 0 \\ \Phi_C^2 + \Phi_C^3 + \Phi_C^6 &= 0 \\ \Phi_A^1 \cdot \bar{\chi} + (\Phi_D^3 + \Phi_C^3) \cdot \bar{\chi} + \Phi_E^4 \cdot (-2\bar{\chi}) + \Phi_E^5 \cdot \bar{\chi} + \Phi_C^6 \cdot (-2\bar{\chi}) + 8l^2q \cdot 4l\bar{\chi} &= \bar{0} \\ \Phi_E^4 \cdot \bar{\theta} + \Phi_E^5 \cdot (-\frac{1}{2}\bar{\theta}) + \Phi_C^6 \cdot \bar{\theta} + 5l^2q \cdot 4l\bar{\theta} &= \bar{0} \end{aligned}$$

$$\frac{EJ}{1} \begin{pmatrix} \frac{5}{4} & 0 & 1 & -\frac{1}{2} \\ 0 & \frac{43}{30} & \frac{9}{20} & -\frac{3}{5} \\ 1 & \frac{9}{20} & \frac{311}{40} & -\frac{59}{20} \\ -\frac{1}{2} & -\frac{3}{5} & -\frac{59}{20} & \frac{59}{40} \end{pmatrix} \begin{pmatrix} \varphi_E \\ \varphi_C \\ \chi \\ \theta \end{pmatrix} = l^2q \begin{pmatrix} 0 \\ 0 \\ 24 \\ 20 \end{pmatrix}$$