The correction factor can be calculated in this form (integrals) with Mathcad:

$$h := 220\ mm \qquad b_f := 45\ mm \qquad h_f := 39\ mm \qquad b_w := 8\ mm \qquad h_w := h - 2 \cdot h_f = 142\ mm$$

$$E_f := 14500\ \frac{N}{mm^2} \qquad E_w := 5300\ \frac{N}{mm^2}$$

$$G_f := 600\ \frac{N}{mm^2} \qquad G_w := 2100\ \frac{N}{mm^2} \qquad q := 4\ \frac{kN}{m} \qquad L := 5\ m$$

$$A_f := b_f \cdot h_f \qquad A_w := b_w \cdot h_w$$

$$GA_T := 2 \cdot G_f \cdot A_f + G_w \cdot A_w = \left(4.4916 \cdot 10^3\right)\ kN$$

$$n := 1000000$$

$$H(z) := \frac{1}{2} \cdot \left(1 + \tanh\left(n \cdot \frac{z}{mm}\right)\right)$$

$$E(z) := E_f \cdot H(z+h) - \left(E_f - E_w\right) \cdot H\left(z + \frac{h}{2} - h_f\right) + \left(E_f - E_w\right) \cdot H\left(z + \frac{h}{2} - h_f - h_w\right)$$

$$G(z) := G_f \cdot H(z+h) - \left(G_f - G_w\right) \cdot H\left(z + \frac{h}{2} - h_f\right) + \left(G_f - G_w\right) \cdot H\left(z + \frac{h}{2} - h_f - h_w\right)$$

$$b(z) := b_f \cdot H(z+h) - \left(b_f - b_w\right) \cdot H\left(z + \frac{h}{2} - h_f\right) + \left(b_f - b_w\right) \cdot H\left(z + \frac{h}{2} - h_f - h_w\right)$$

$$EI := \int_{\frac{-h}{2}}^{\frac{h}{2}} E(z) \cdot b(z) \cdot z^2\, dz = \left(4.334 \cdot 10^{11}\right)\ N \cdot mm^2$$

$$T(z) := -\frac{q \cdot L}{2 \cdot EI} \cdot \int_{\frac{-h}{2}}^{z} E(z) \cdot b(z) \cdot z\, dz \qquad \tau(z) := \frac{T(z)}{b(z)}$$

$$U := \frac{1}{2} \cdot \int_{\frac{-1}{2}}^{\frac{1}{2}} \int_{\frac{-h}{2}}^{\frac{h}{2}} \frac{T(z)^2}{G(z) \cdot b(z)}\, dz\, dy = 14.1957\ N \qquad W(k) := \frac{1}{2} \cdot \frac{k}{GA_T} \cdot \left(\frac{q \cdot L}{2}\right)^2$$

$$k := \frac{U}{\frac{1}{2} \cdot \frac{1}{GA_T} \cdot \left(\frac{q \cdot L}{2}\right)^2} = 1.2752$$