

Opmerkingen: Zie §6.4, voorbeeld 2, blz. 403 t/m 407

Antwoorden 6.30-1:

- a. $M_t^{(AB)} = +120 \text{ Nm}$, $M_t^{(BC)} = +80 \text{ Nm}$, $M_t^{(CD)} = +100 \text{ Nm}$
- b. $\chi^{(AB)} = +30 \times 10^{-3} \text{ rad/m}$
 $\chi^{(BC)} = +50 \times 10^{-3} \text{ rad/m}$
 $\chi^{(CD)} = +40 \times 10^{-3} \text{ rad/m}$
- c. $\Delta\varphi_x^{(AB)} = +22,5 \times 10^{-3} \text{ rad}$
 $\Delta\varphi_x^{(BC)} = +50 \times 10^{-3} \text{ rad}$
 $\Delta\varphi_x^{(CD)} = +50 \times 10^{-3} \text{ rad}$
- d. $\varphi_{x;B} - \varphi_{x;A} = \Delta\varphi_x^{(AB)} = +22,5 \times 10^{-3} \text{ rad}$
- e. $\varphi_{x;C} - \varphi_{x;A} = \Delta\varphi_x^{(AB)} + \Delta\varphi_x^{(BC)} = +72,5 \times 10^{-3} \text{ rad}$
- f. $\varphi_{x;D} - \varphi_{x;A} = \Delta\varphi_x^{(AB)} + \Delta\varphi_x^{(BC)} + \Delta\varphi_x^{(CD)} = +122,5 \times 10^{-3} \text{ rad}$

Toelichting:

$$\chi^{(AB)} = \frac{M_t^{(AB)}}{GI_t^{(AB)}} = \frac{120 \text{ Nm}}{4 \times 10^3 \text{ Nm}^2} = 30 \times 10^{-3} \text{ m}^{-1} \text{ (of rad/m)}$$

$$\Delta\varphi_x^{(AB)} = \chi^{(AB)} \ell^{(AB)} = (+30 \times 10^{-3} \text{ rad/m})(0,75 \text{ m}) = +22,5 \times 10^{-3} \text{ rad}$$

Antwoorden 6.30-2:

- a. $M_t^{(AB)} = +80 \text{ Nm}$, $M_t^{(BC)} = -40 \text{ Nm}$, $M_t^{(CD)} = +50 \text{ Nm}$
- b. $\chi^{(AB)} = +20 \times 10^{-3} \text{ rad/m}$
 $\chi^{(BC)} = -25 \times 10^{-3} \text{ rad/m}$
 $\chi^{(CD)} = +20 \times 10^{-3} \text{ rad/m}$
- c. $\Delta\varphi_x^{(AB)} = +15 \times 10^{-3} \text{ rad}$
 $\Delta\varphi_x^{(BC)} = -25 \times 10^{-3} \text{ rad}$
 $\Delta\varphi_x^{(CD)} = +10 \times 10^{-3} \text{ rad}$
- d. $\varphi_{x;B} - \varphi_{x;A} = \Delta\varphi_x^{(AB)} = +15 \times 10^{-3} \text{ rad}$
- e. $\varphi_{x;C} - \varphi_{x;A} = \Delta\varphi_x^{(AB)} + \Delta\varphi_x^{(BC)} = -10 \times 10^{-3} \text{ rad}$
- f. $\varphi_{x;D} - \varphi_{x;A} = \Delta\varphi_x^{(AB)} + \Delta\varphi_x^{(BC)} + \Delta\varphi_x^{(CD)} = 0$

Toelichting:

$$\chi^{(AB)} = \frac{M_t^{(AB)}}{GI_t^{(AB)}} = \frac{80 \text{ Nm}}{4 \times 10^3 \text{ Nm}^2} = 20 \times 10^{-3} \text{ m}^{-1} \text{ (of rad/m)}$$

$$\Delta\varphi_x^{(AB)} = \chi^{(AB)} \ell^{(AB)} = (+20 \times 10^{-3} \text{ rad/m})(0,75 \text{ m}) = +15 \times 10^{-3} \text{ rad}$$