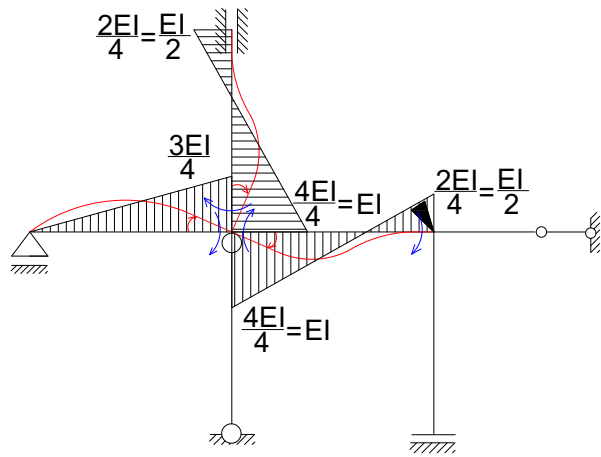
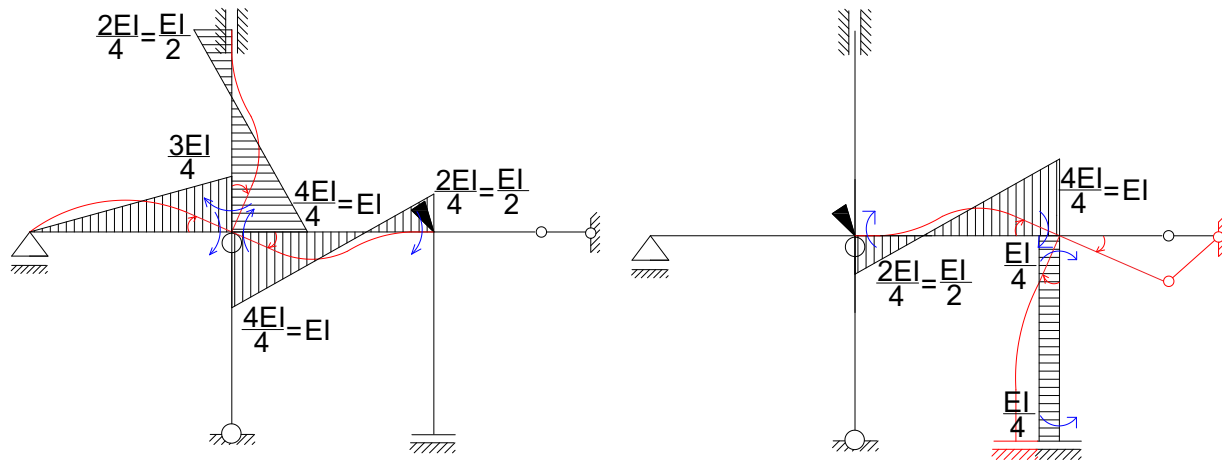
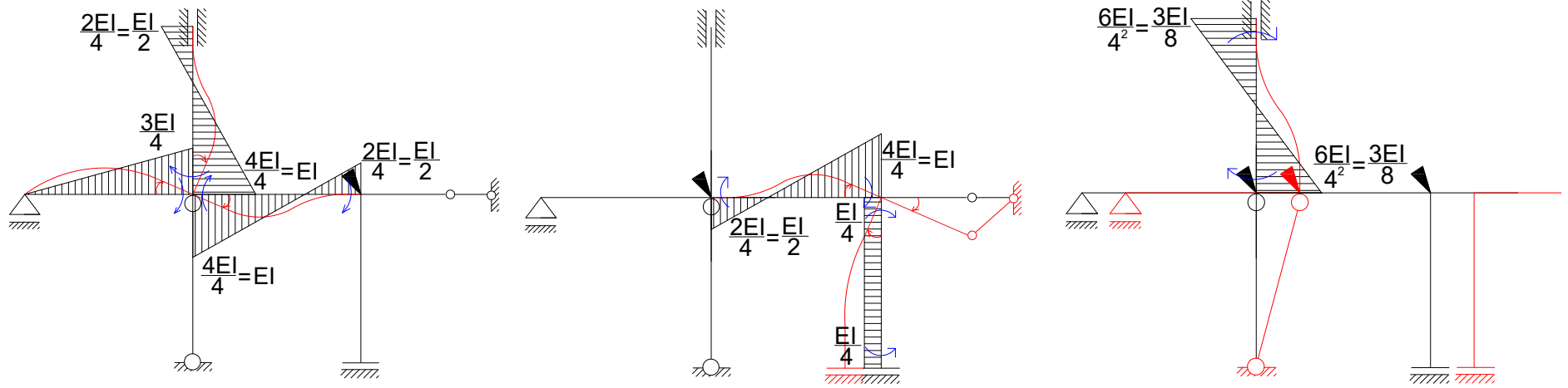
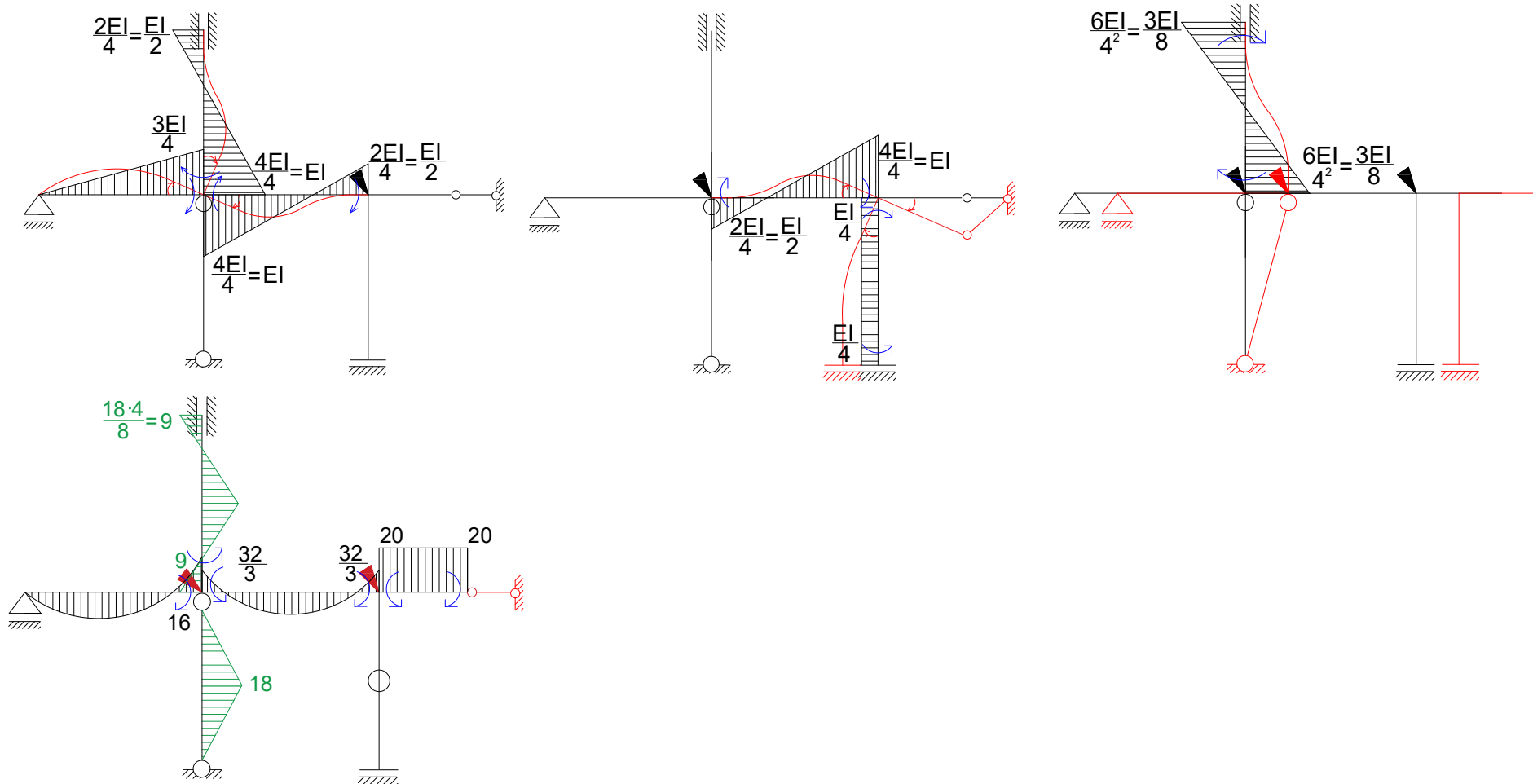


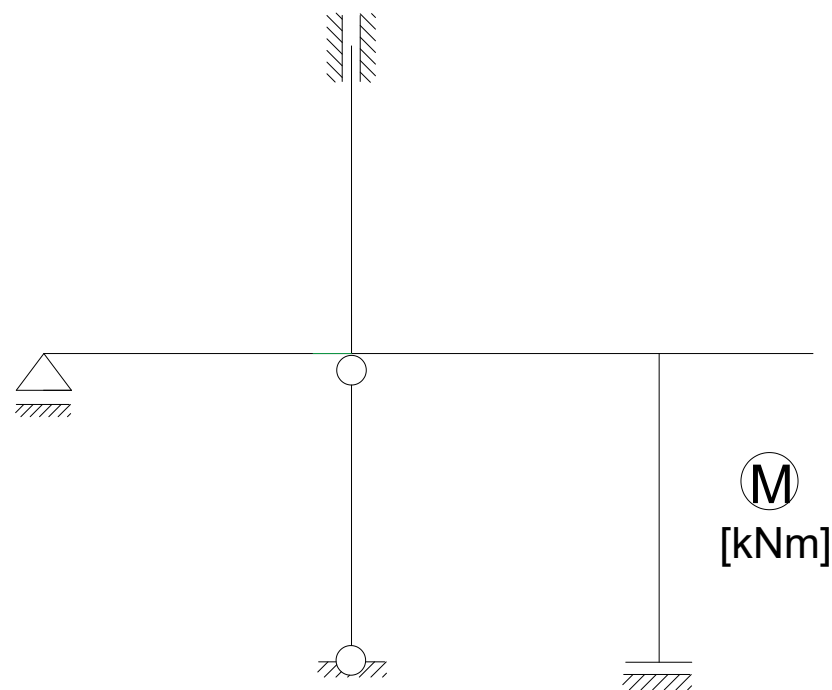
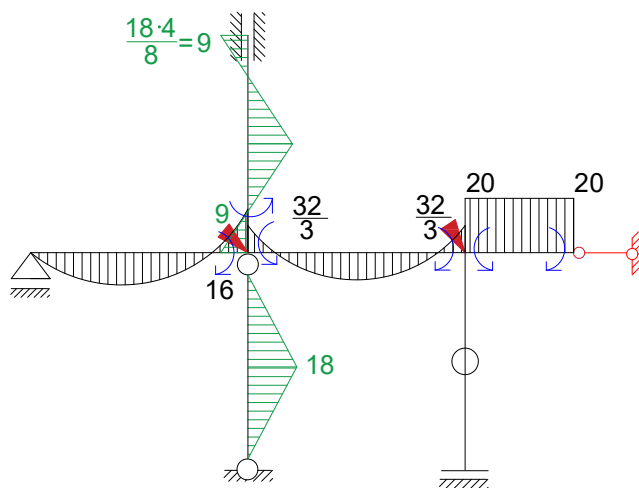
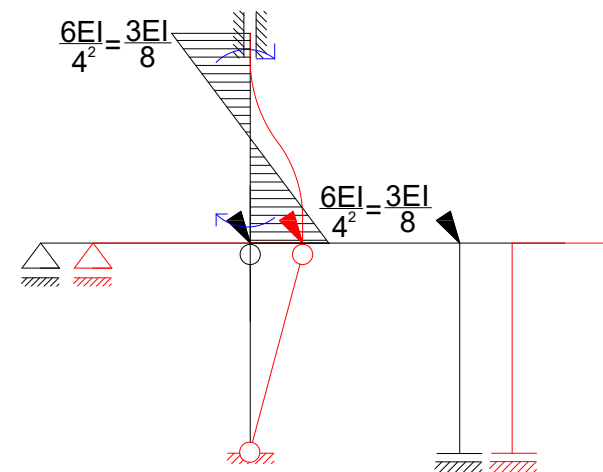
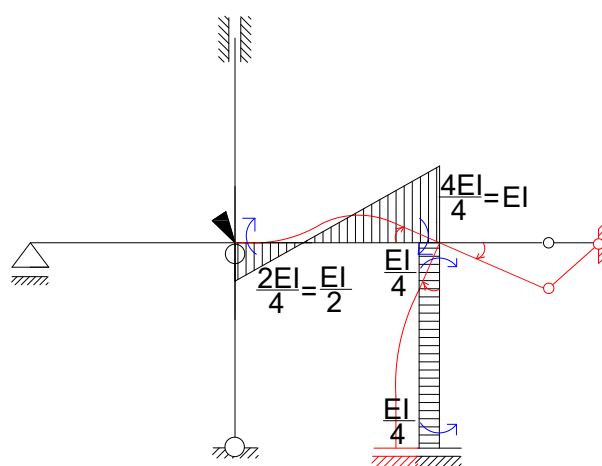
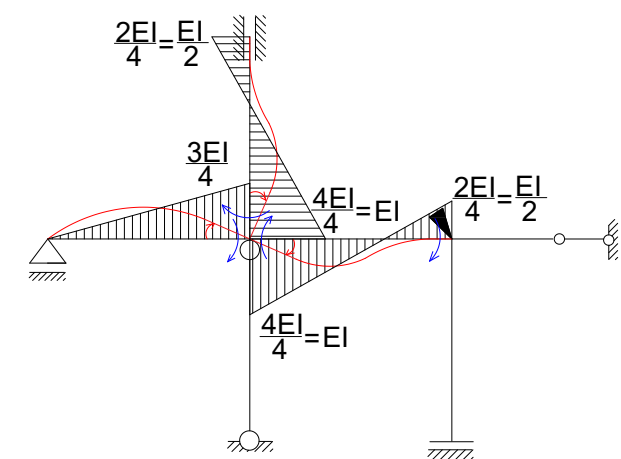
Zadanie: Na podstawie wyników z poprzedniego zadania narysuj końcowy wykres momentów.



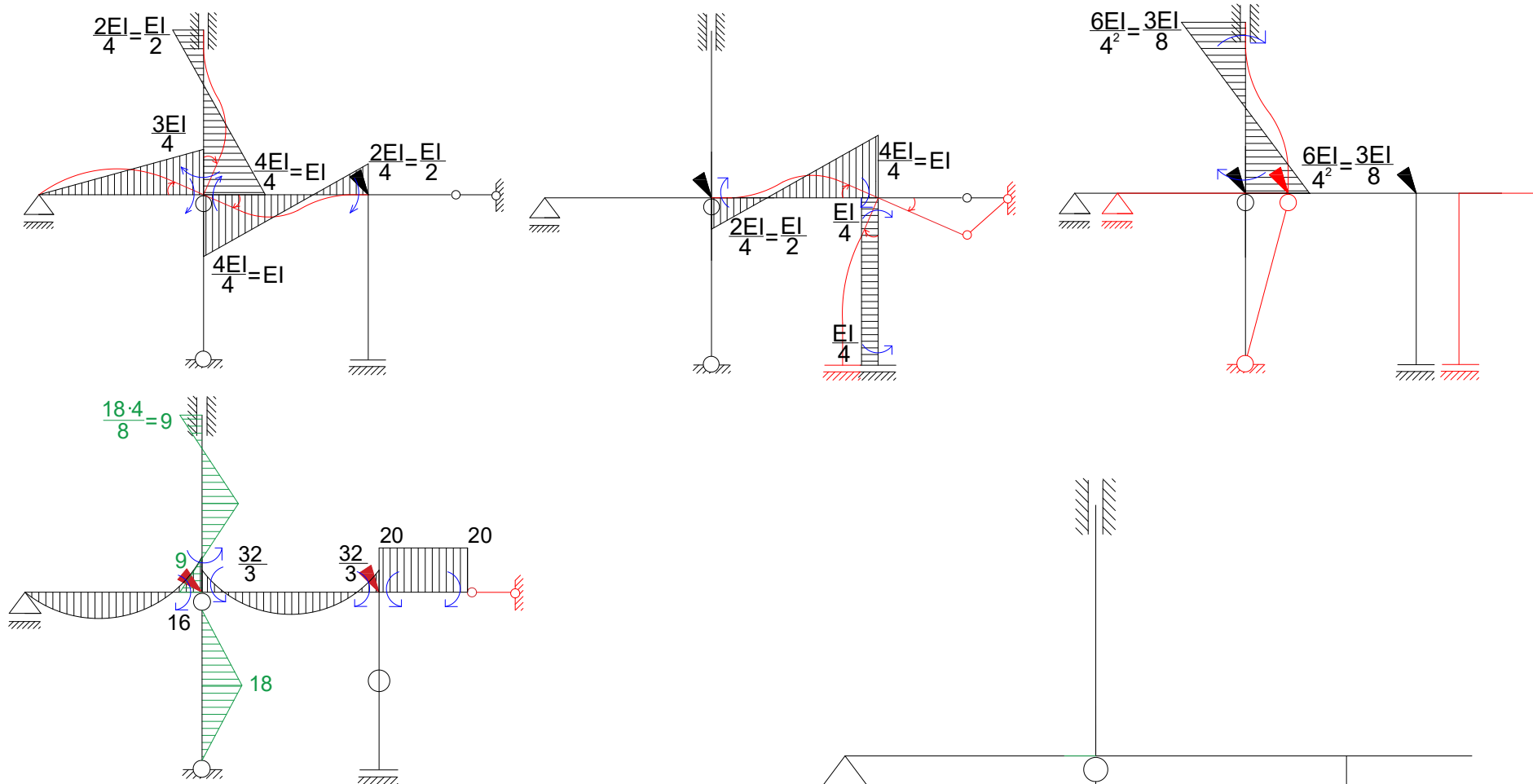




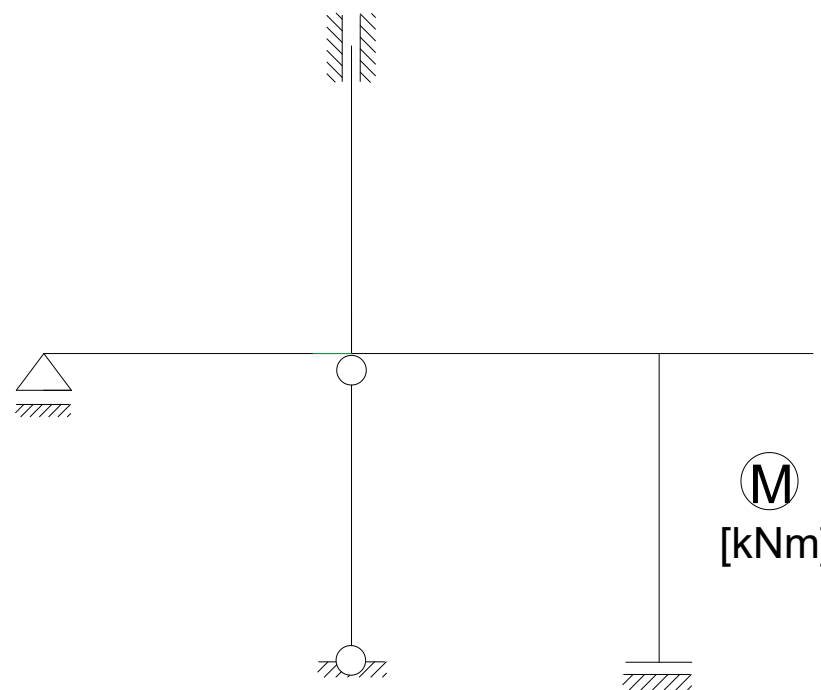




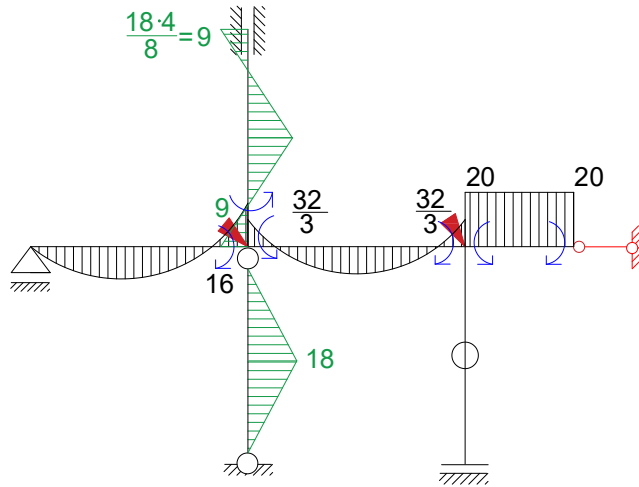
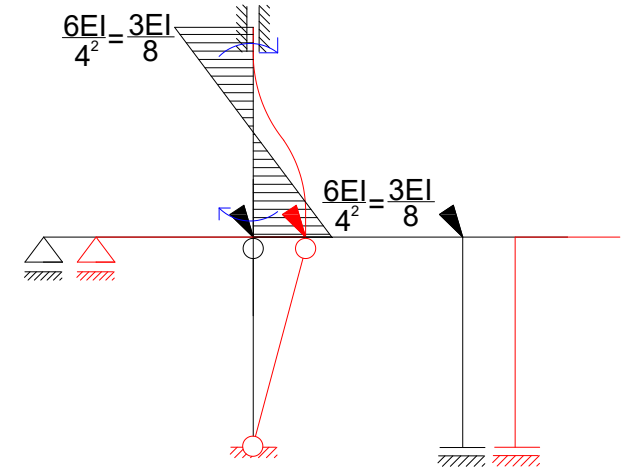
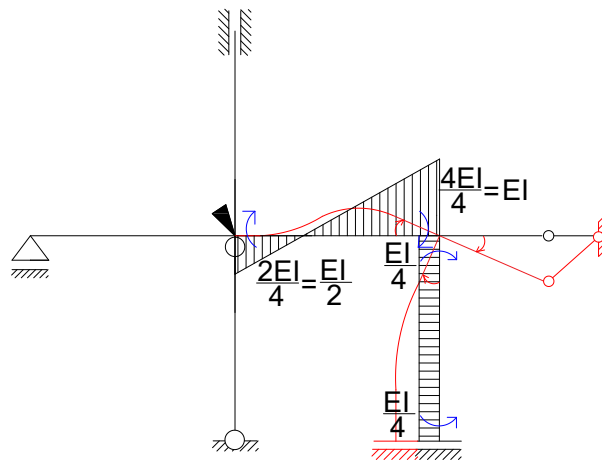
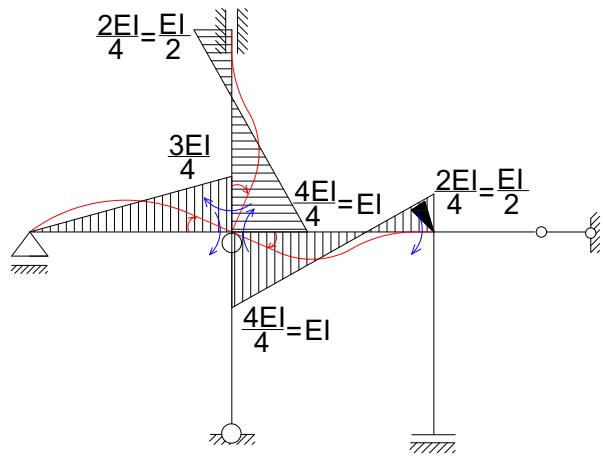
M
[kNm]



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$



M
[kNm]

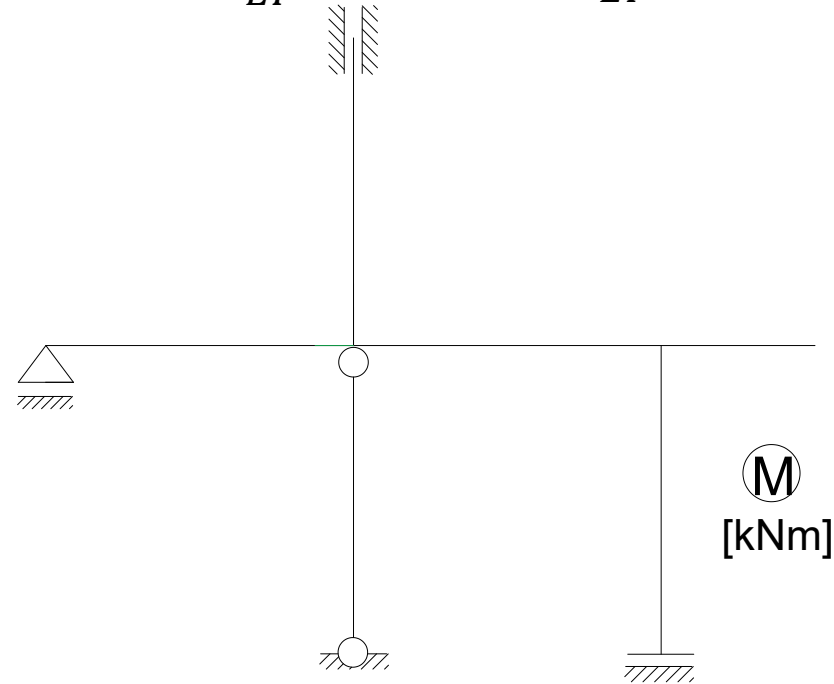


$$\varphi_1 = -\frac{20,037}{EI}$$

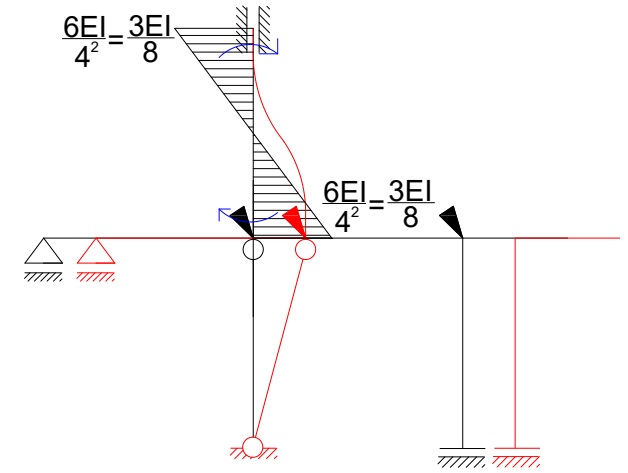
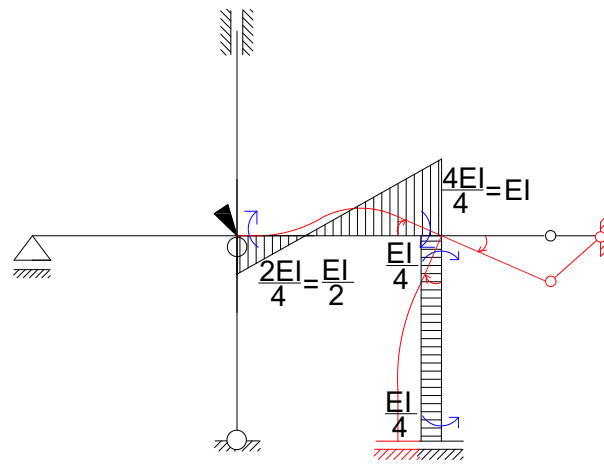
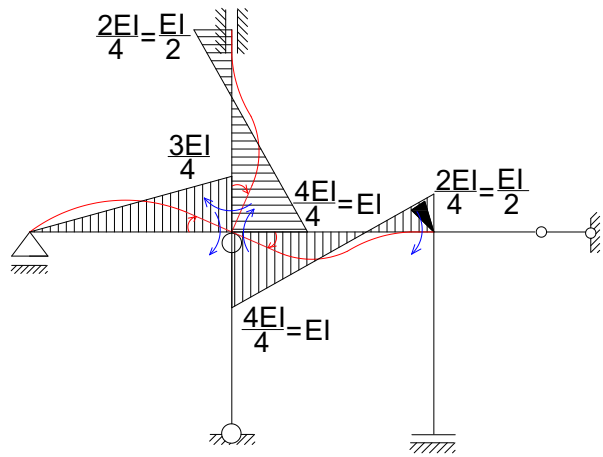
$$\varphi_2 = \frac{15,481}{EI}$$

$$\Delta_3 = \frac{136,074}{EI}$$

$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$



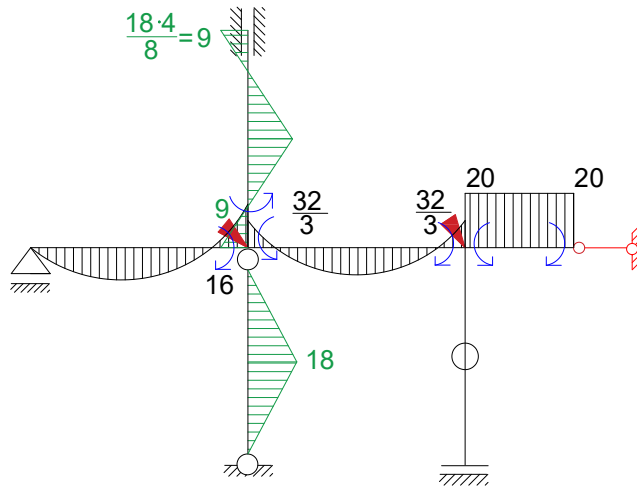
M
[kNm]



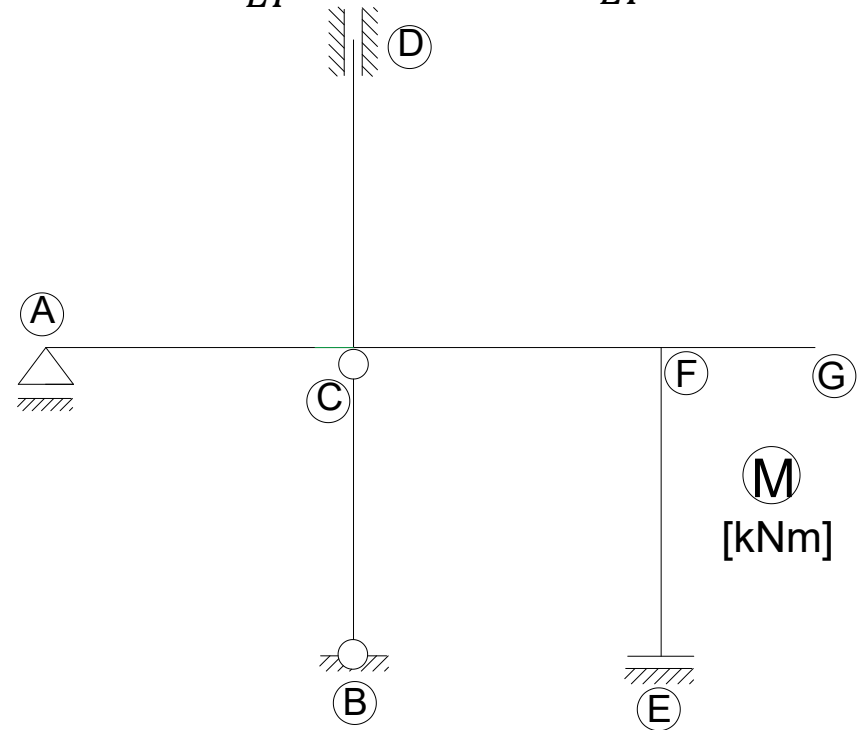
$$\varphi_1 = -\frac{20,037}{EI}$$

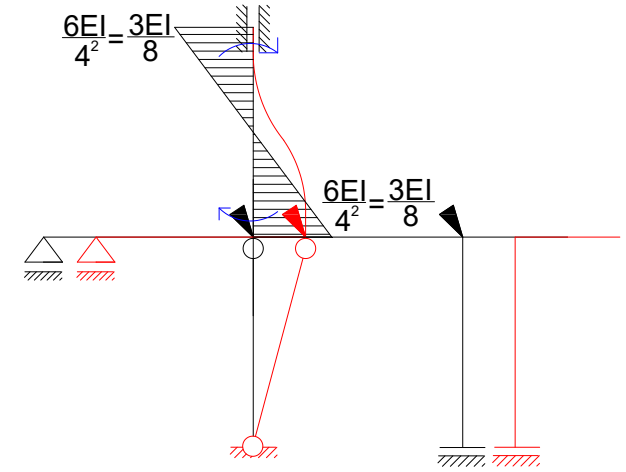
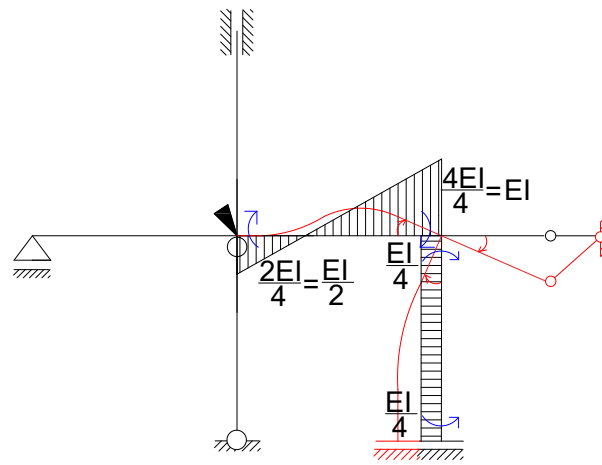
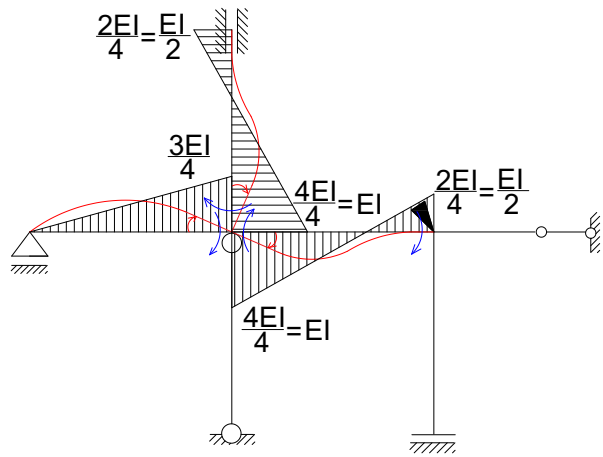
$$\varphi_2 = \frac{15,481}{EI}$$

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$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

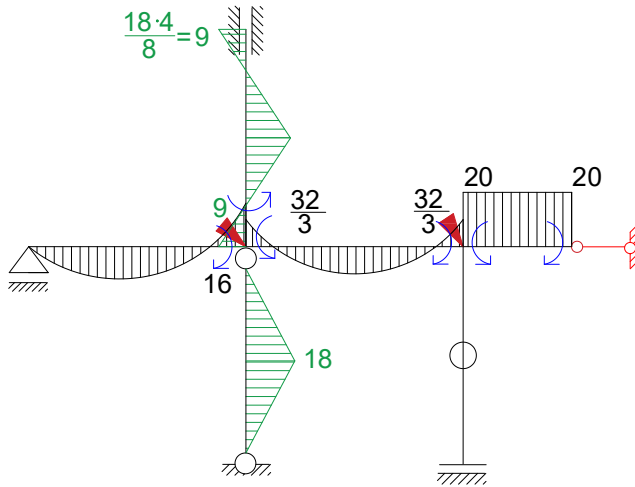




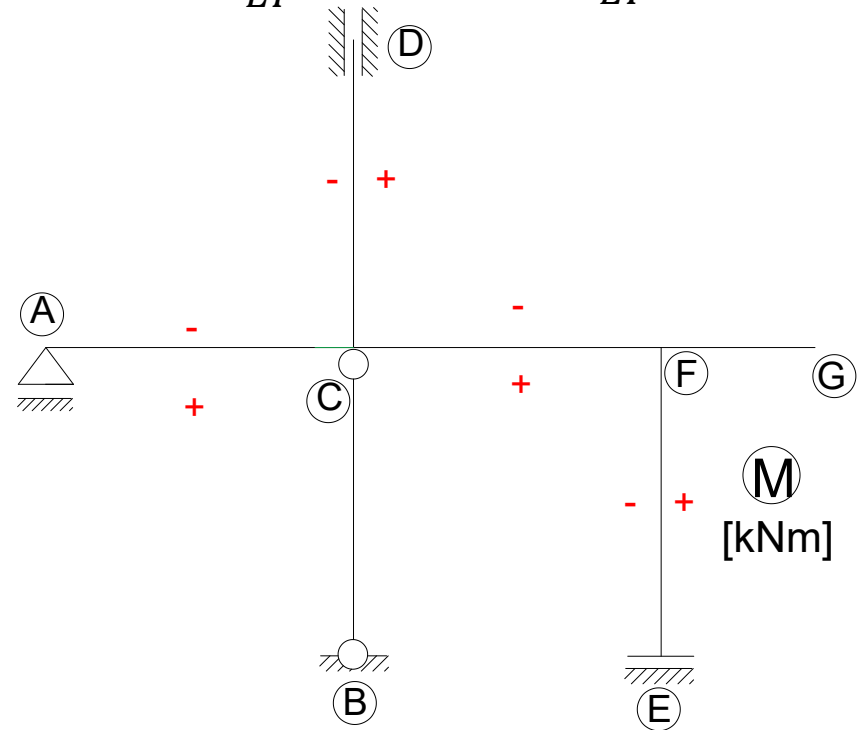
$$\varphi_1 = -\frac{20,037}{EI}$$

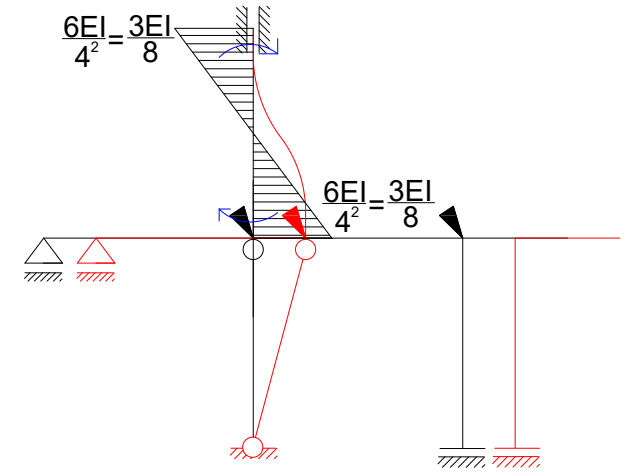
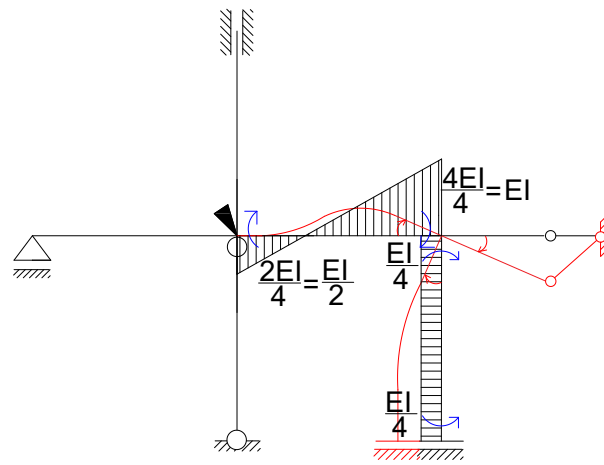
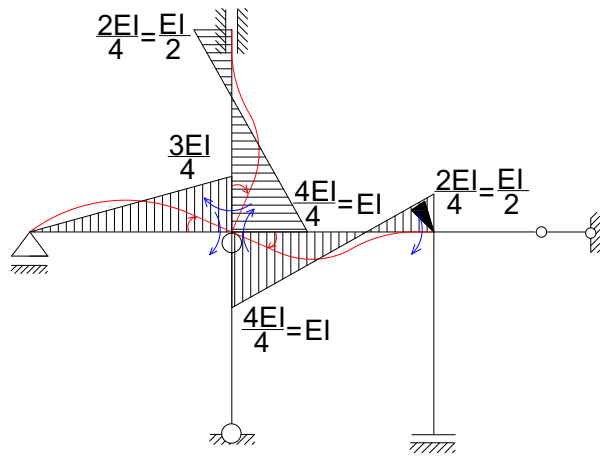
$$\varphi_2 = \frac{15,481}{EI}$$

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$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

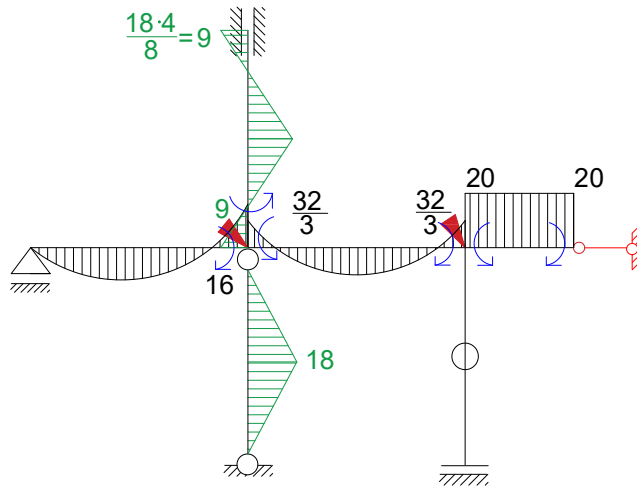




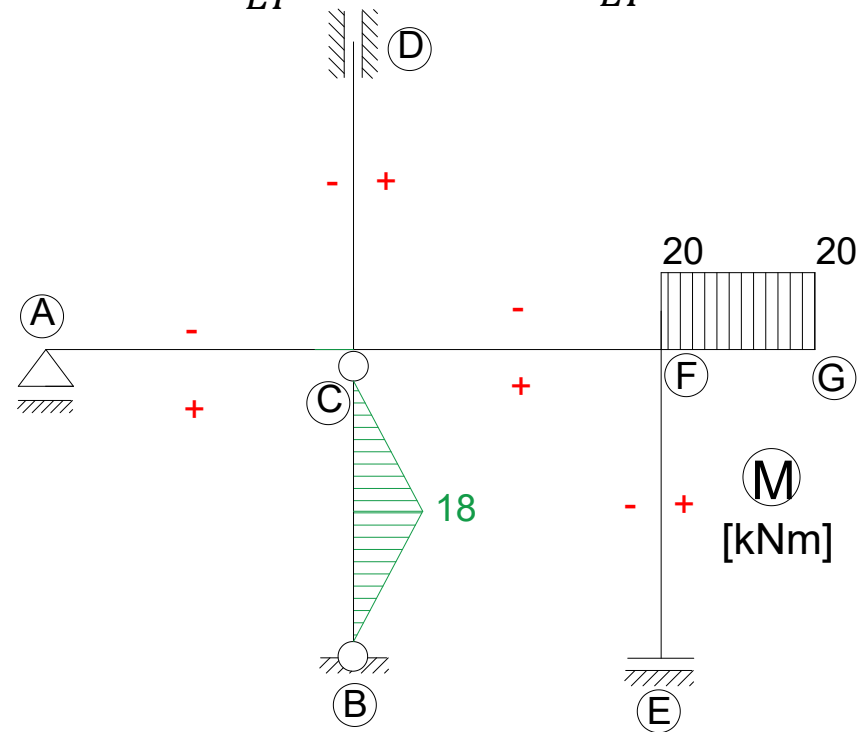
$$\varphi_1 = -\frac{20,037}{EI}$$

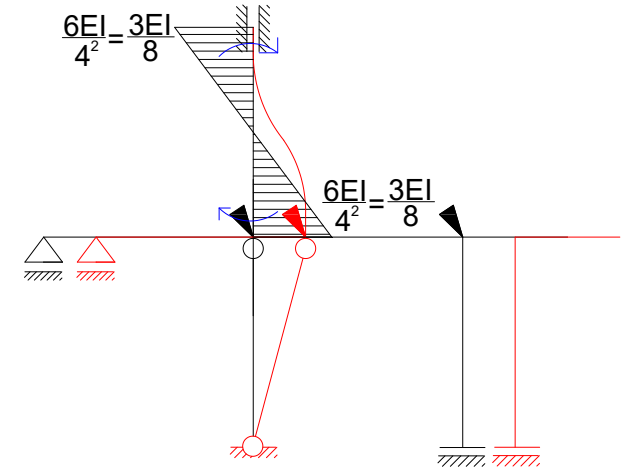
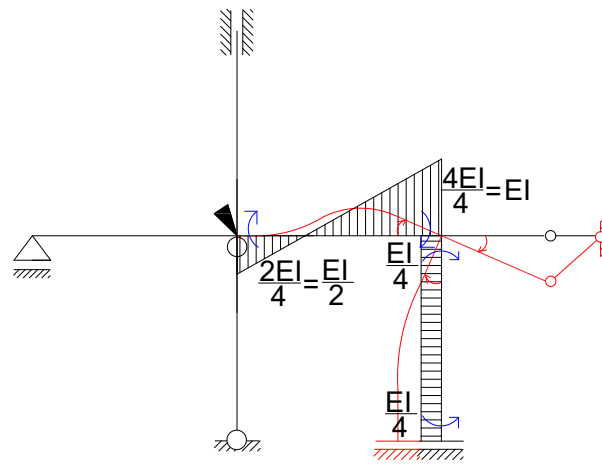
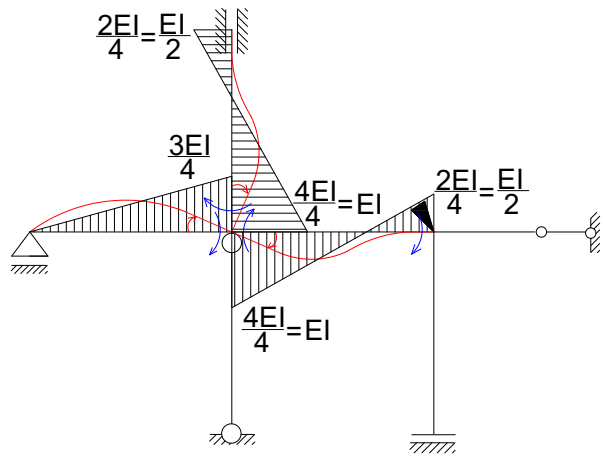
$$\varphi_2 = \frac{15,481}{EI}$$

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$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

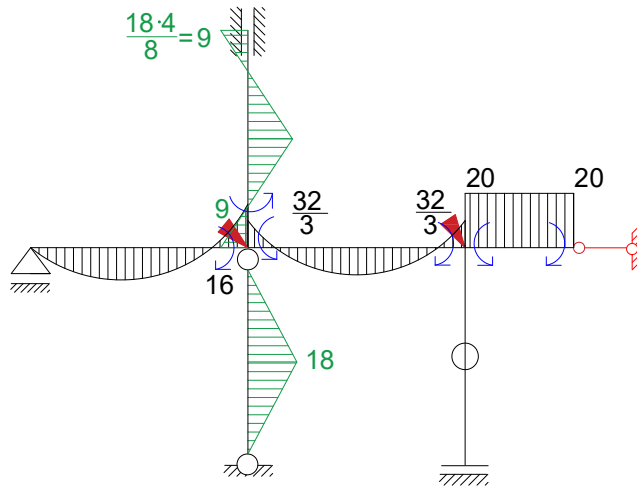




$$\varphi_1 = -\frac{20,037}{EI}$$

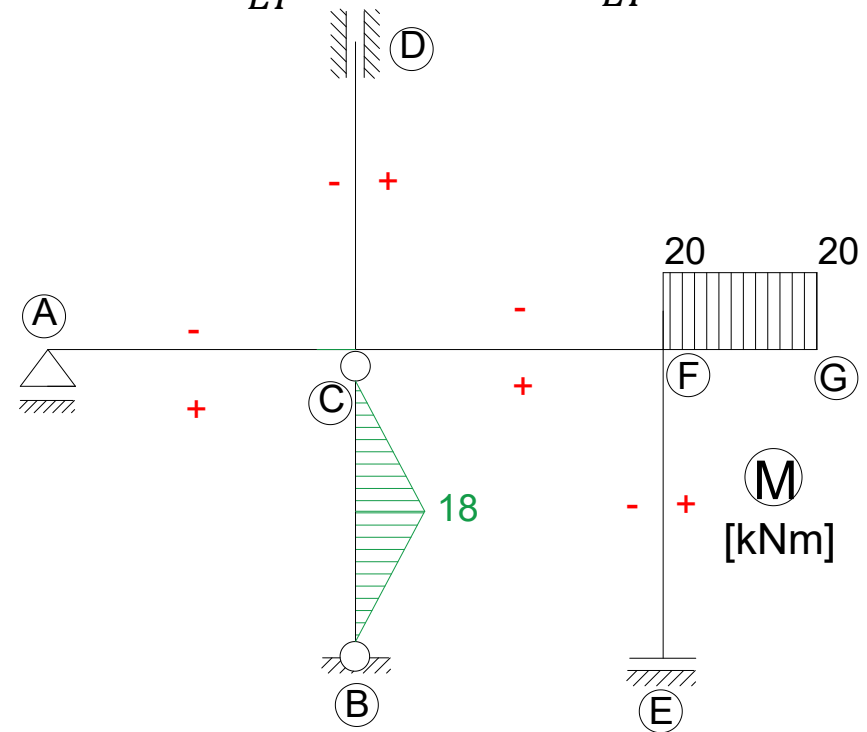
$$\varphi_2 = \frac{15,481}{EI}$$

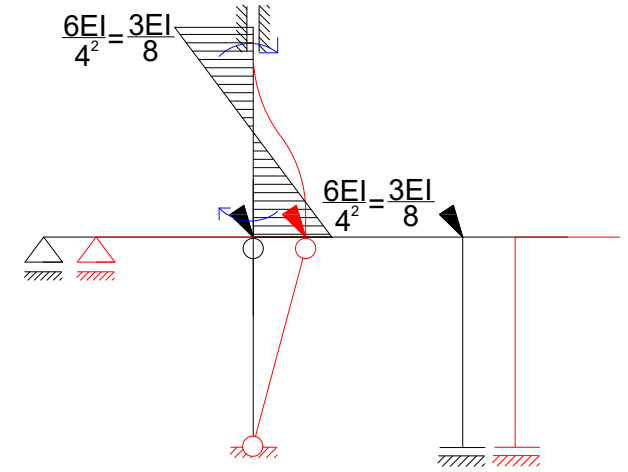
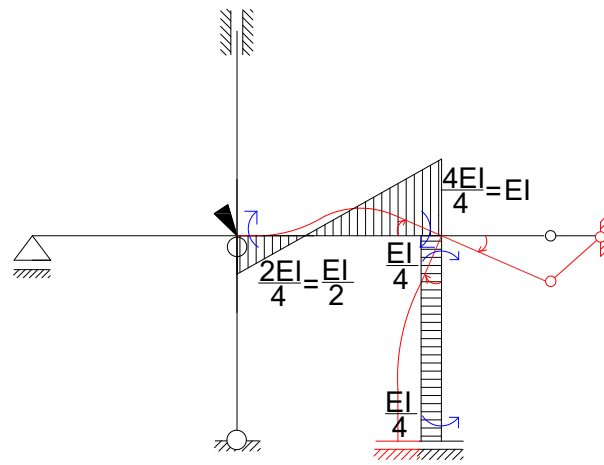
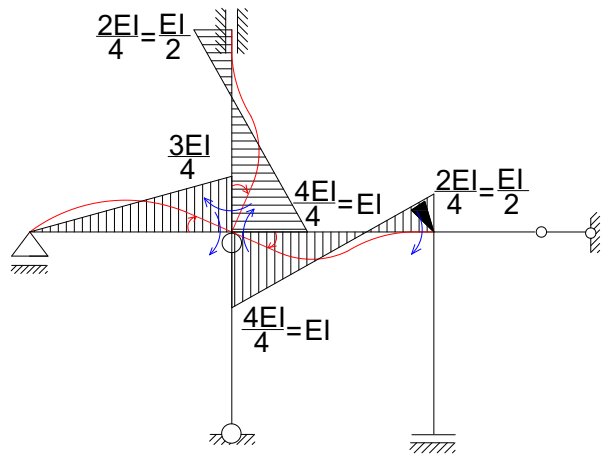
$$\Delta_3 = \frac{136,074}{EI}$$



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{CL} = -\frac{3EI}{4} \cdot \left(-\frac{20,037}{EI} \right) - 16 = -0,97 kNm$$

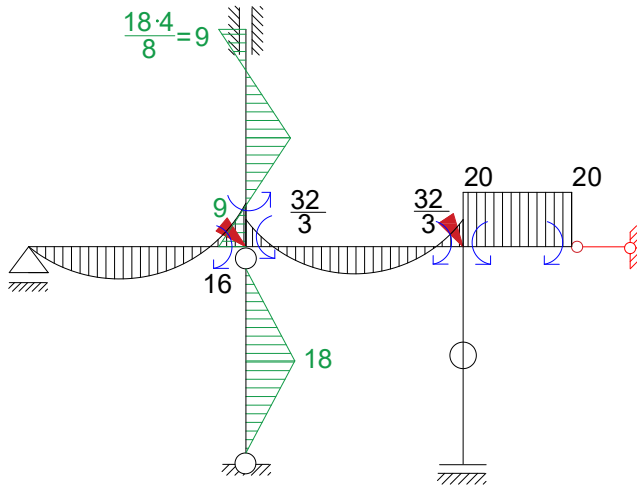




$$\varphi_1 = -\frac{20,037}{EI}$$

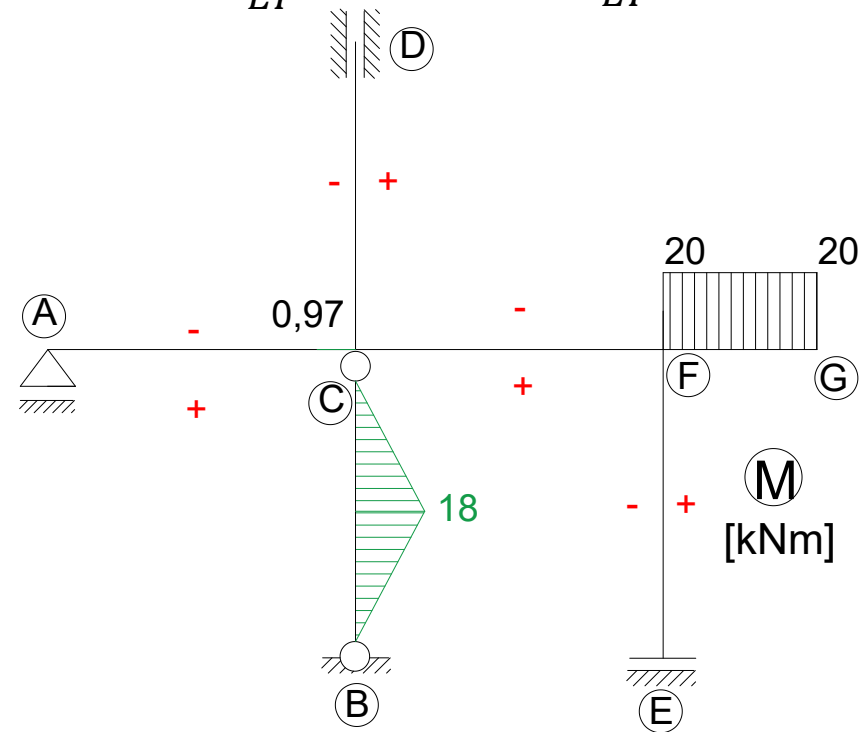
$$\varphi_2 = \frac{15,481}{EI}$$

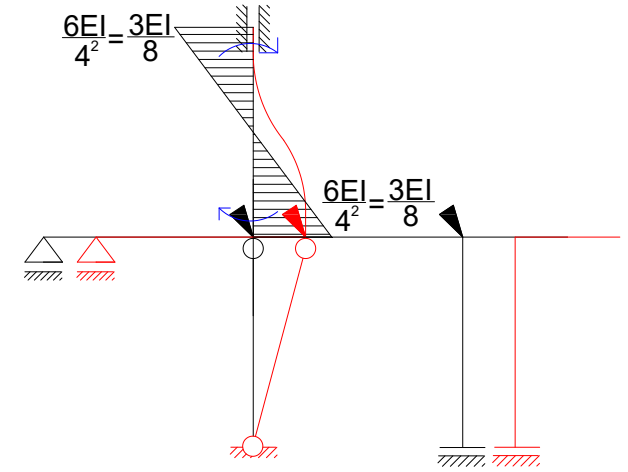
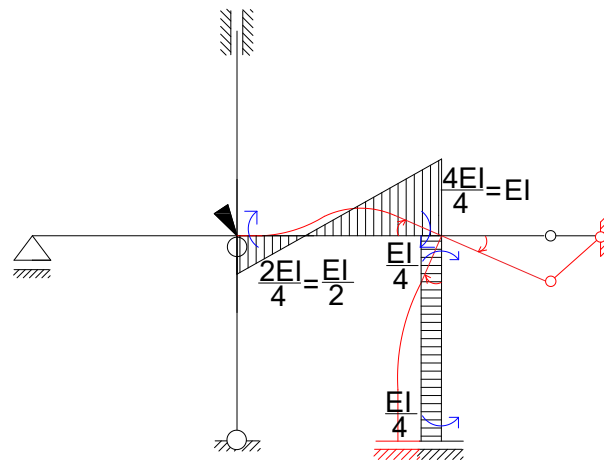
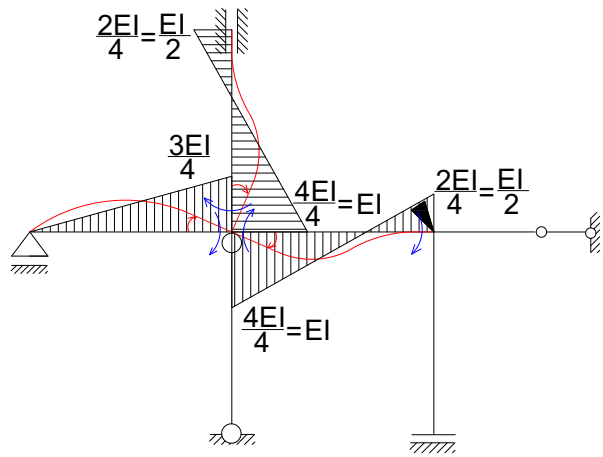
$$\Delta_3 = \frac{136,074}{EI}$$



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$$M_{CL} = -\frac{3EI}{4} \cdot \left(-\frac{20,037}{EI} \right) - 16 = -0,97 kNm$$

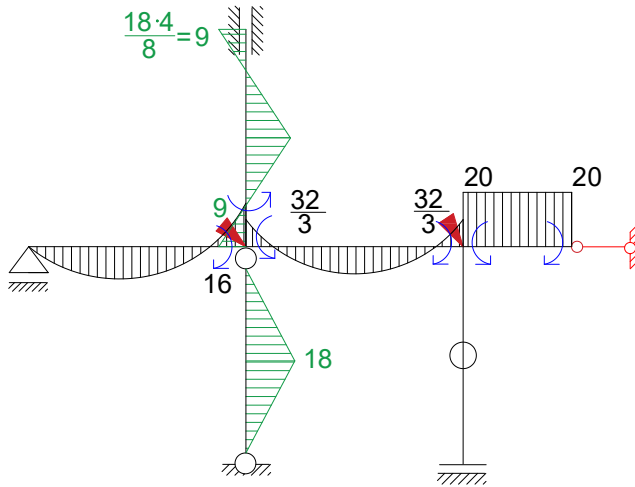




$$\varphi_1 = -\frac{20,037}{EI}$$

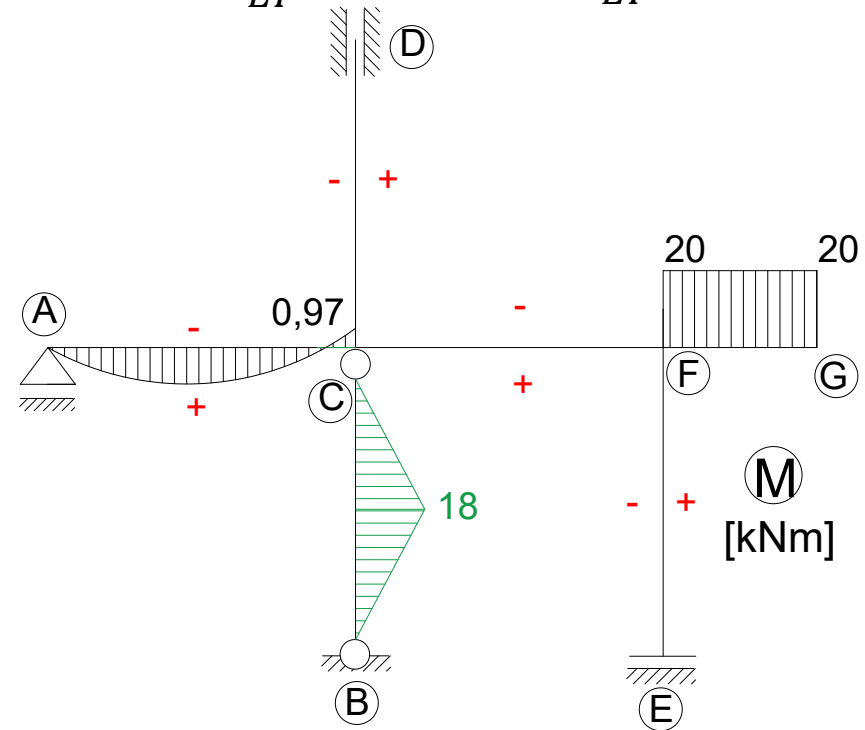
$$\varphi_2 = \frac{15,481}{EI}$$

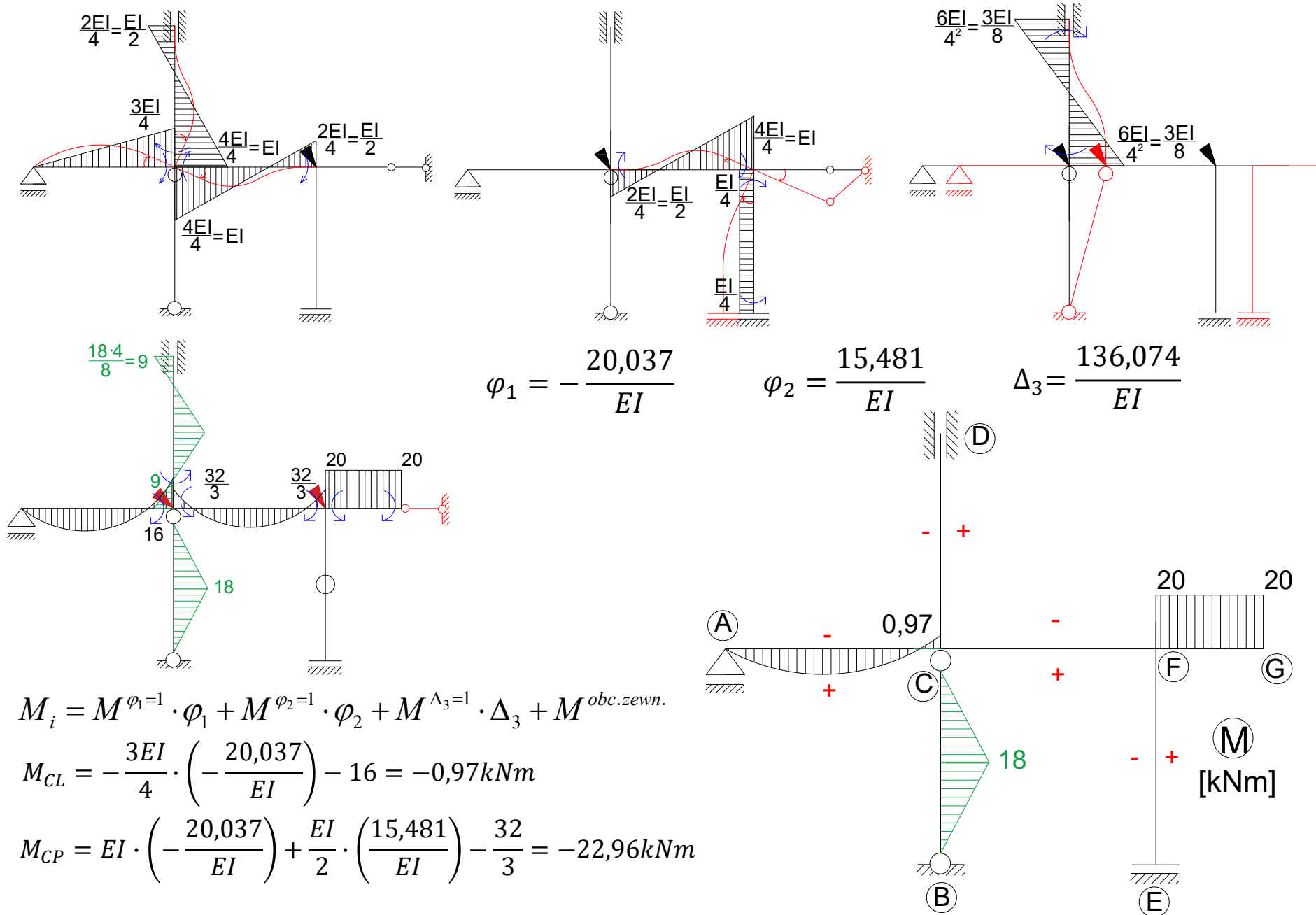
$$\Delta_3 = \frac{136,074}{EI}$$

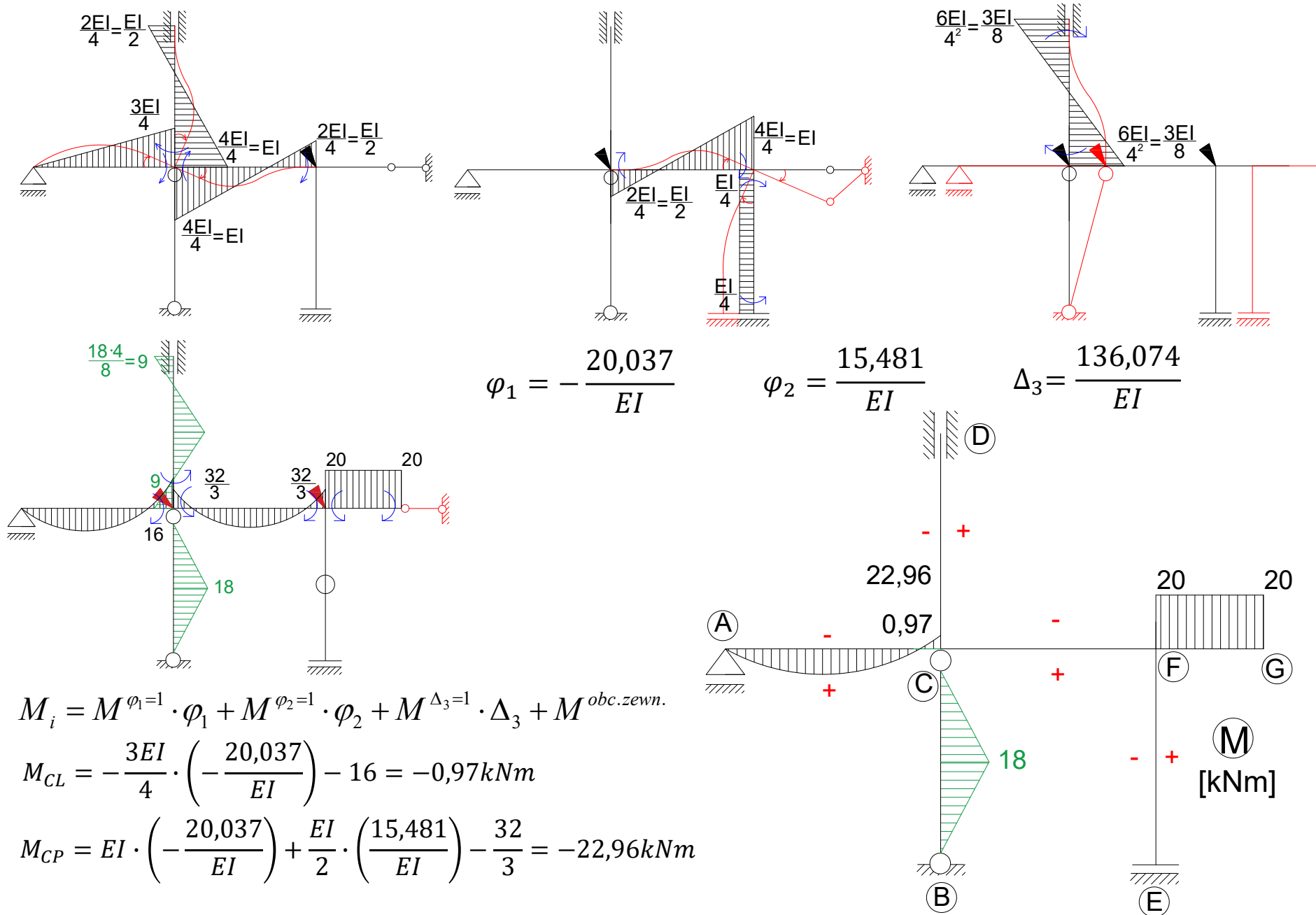


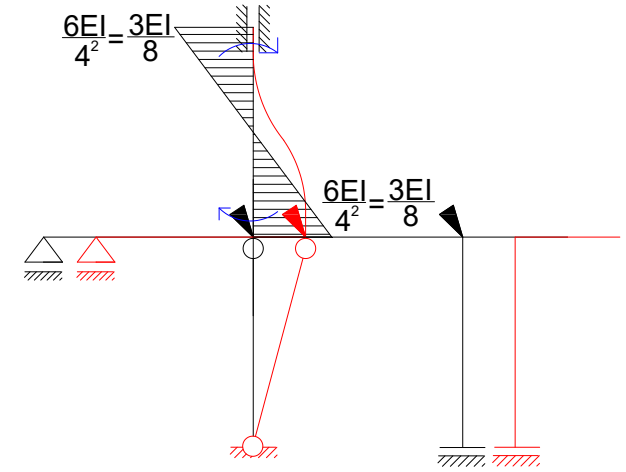
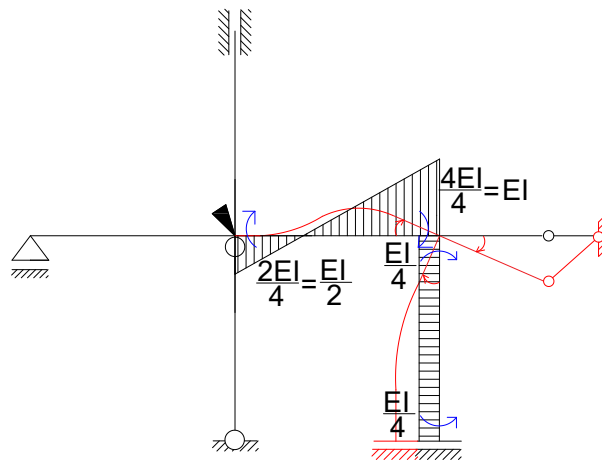
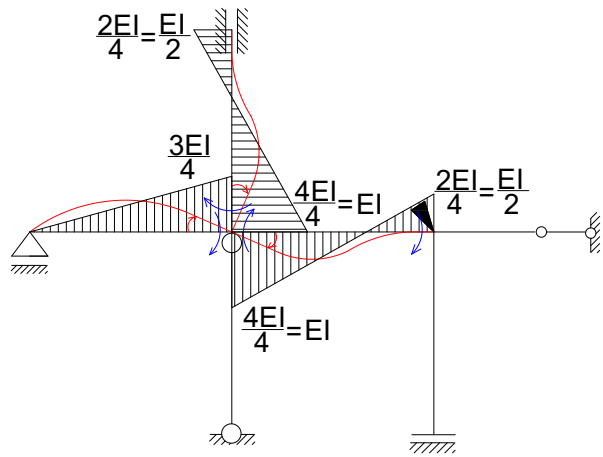
$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{CL} = -\frac{3EI}{4} \cdot \left(-\frac{20,037}{EI} \right) - 16 = -0,97 kNm$$





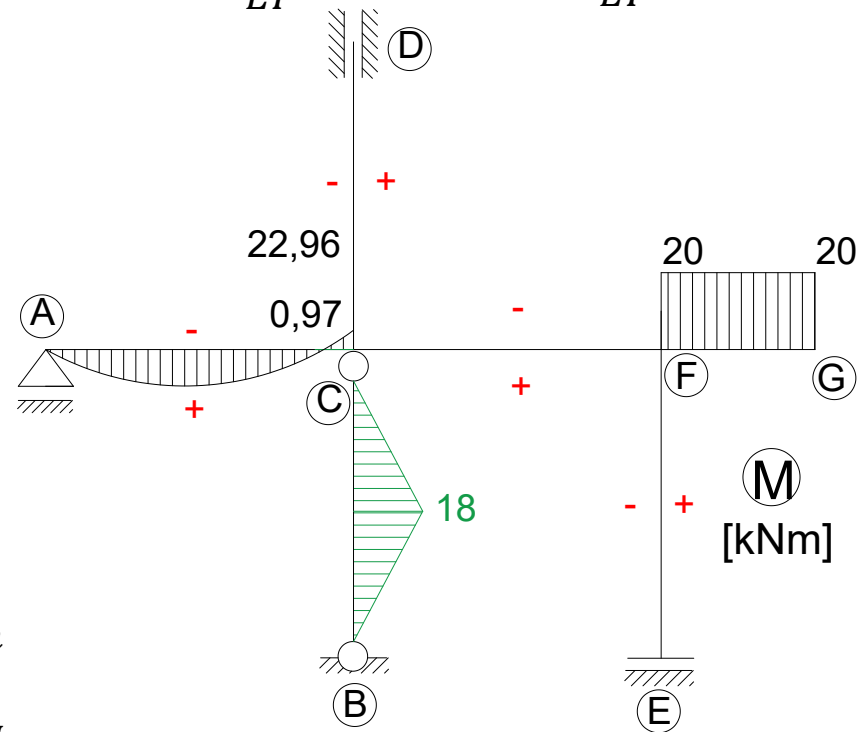
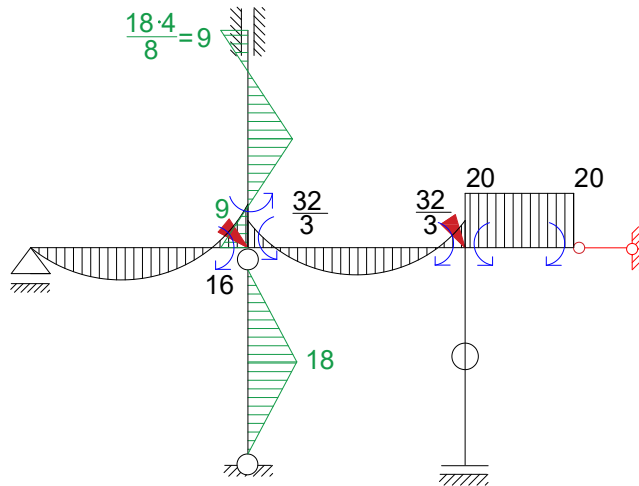




$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

$$\Delta_3 = \frac{136,074}{EI}$$

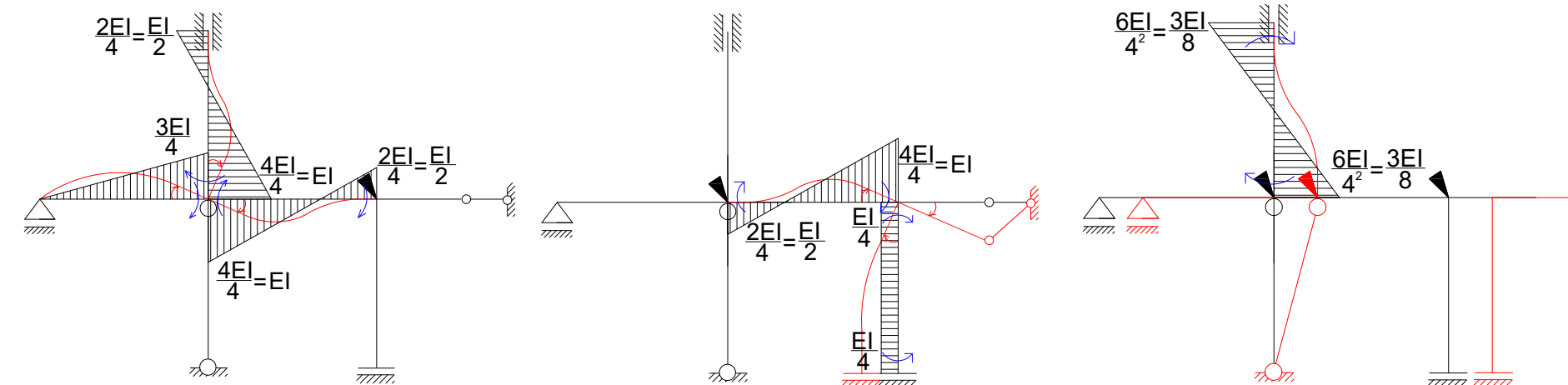


$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{CL} = -\frac{3EI}{4} \cdot \left(-\frac{20,037}{EI}\right) - 16 = -0,97 kNm$$

$$M_{CP} = EI \cdot \left(-\frac{20,037}{EI}\right) + \frac{EI}{2} \cdot \left(\frac{15,481}{EI}\right) - \frac{32}{3} = -22,96 kNm$$

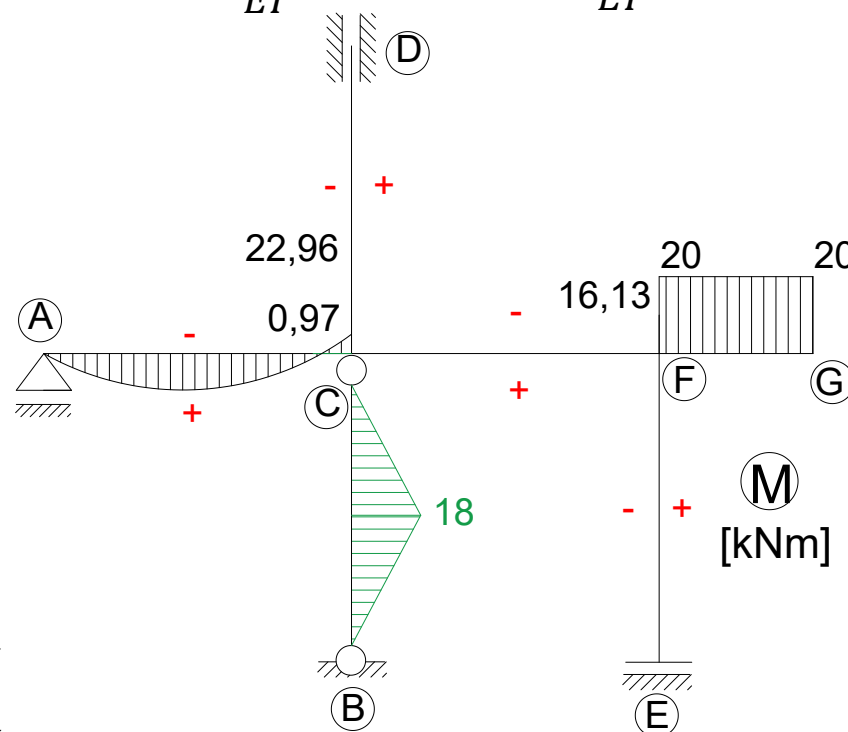
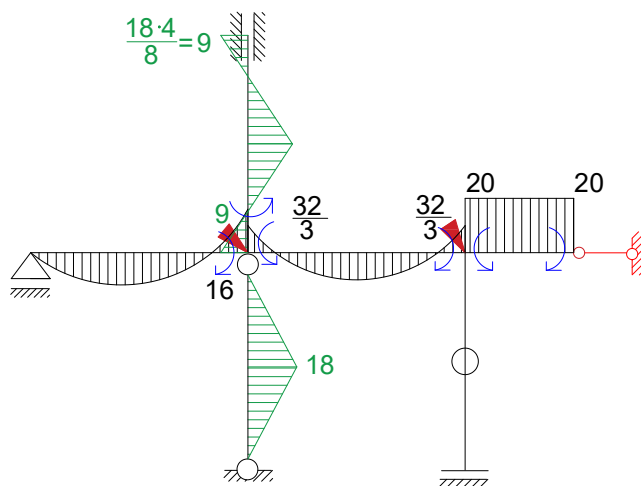
$$M_{FL} = -\frac{EI}{2} \cdot \left(-\frac{20,037}{EI}\right) - EI \cdot \left(\frac{15,481}{EI}\right) - \frac{32}{3} = -16,13 kNm$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

$$\Delta_3 = \frac{136,074}{EI}$$

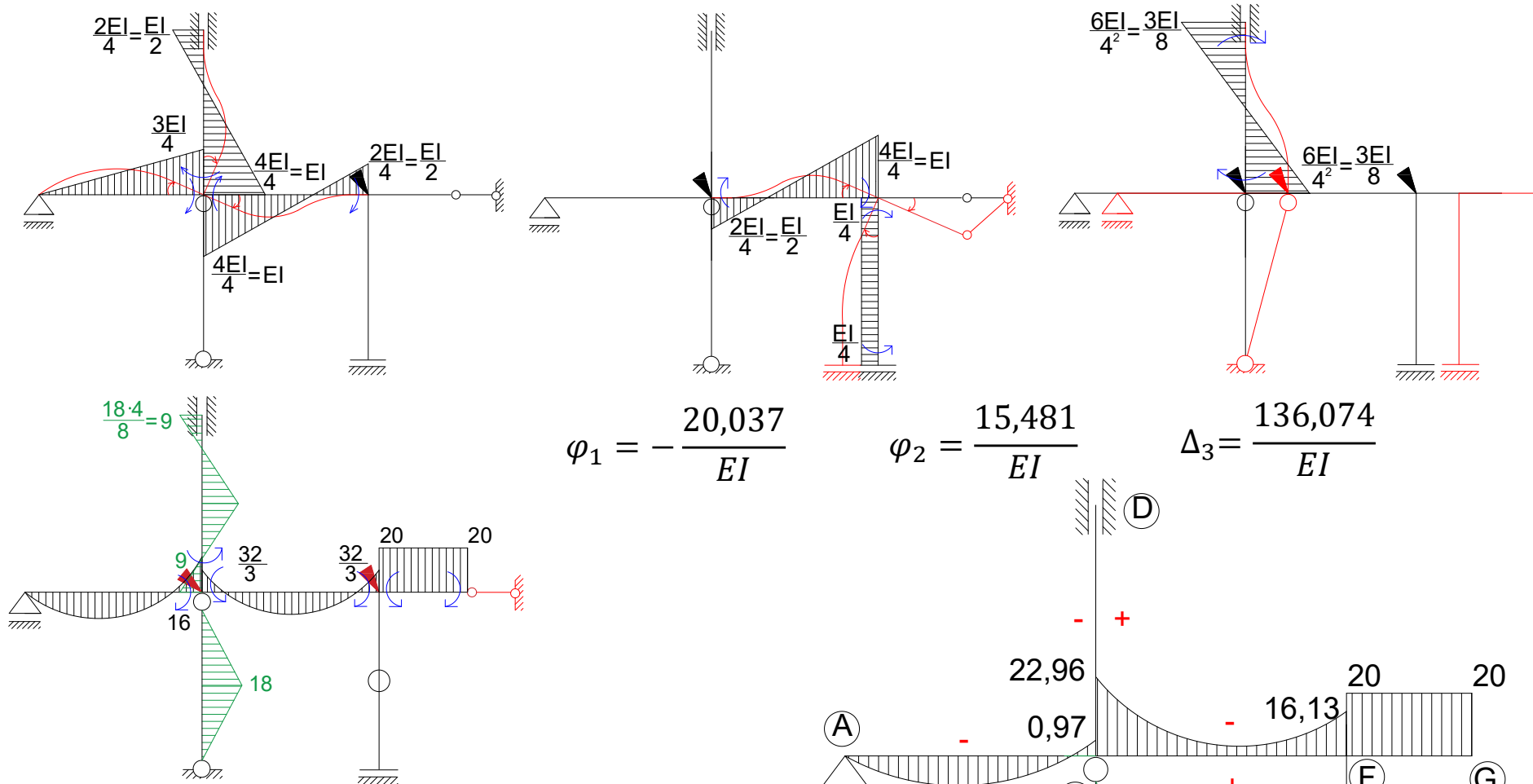


$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{CL} = -\frac{3EI}{4} \cdot \left(-\frac{20,037}{EI}\right) - 16 = -0,97 kNm$$

$$M_{CP} = EI \cdot \left(-\frac{20,037}{EI}\right) + \frac{EI}{2} \cdot \left(\frac{15,481}{EI}\right) - \frac{32}{3} = -22,96 kNm$$

$$M_{FL} = -\frac{EI}{2} \cdot \left(-\frac{20,037}{EI}\right) - EI \cdot \left(\frac{15,481}{EI}\right) - \frac{32}{3} = -16,13 kNm$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

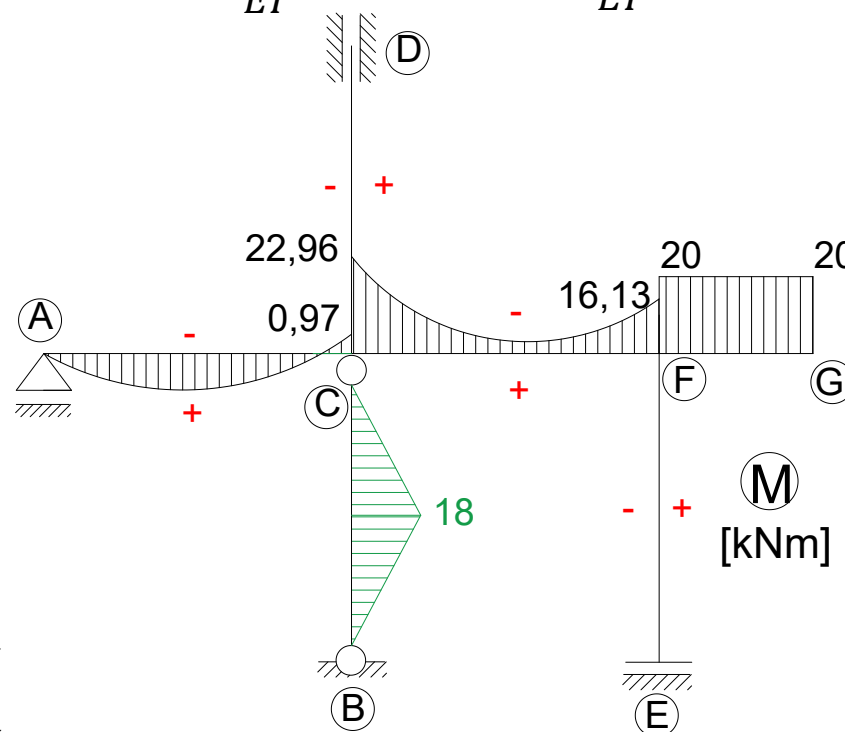
$$\Delta_3 = \frac{136,074}{EI}$$

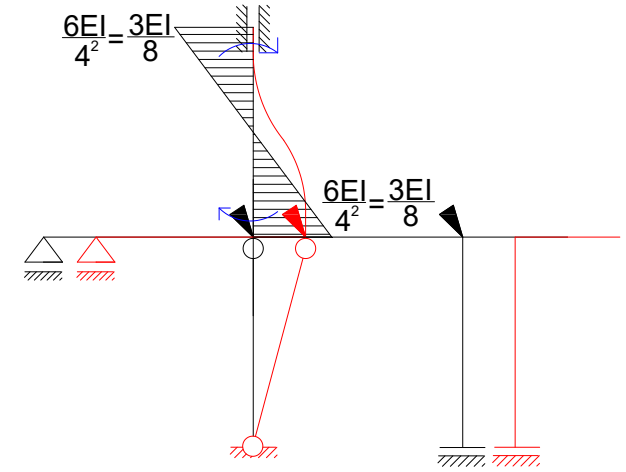
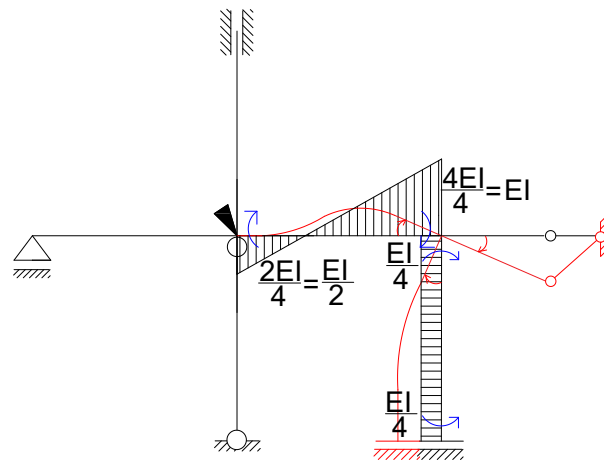
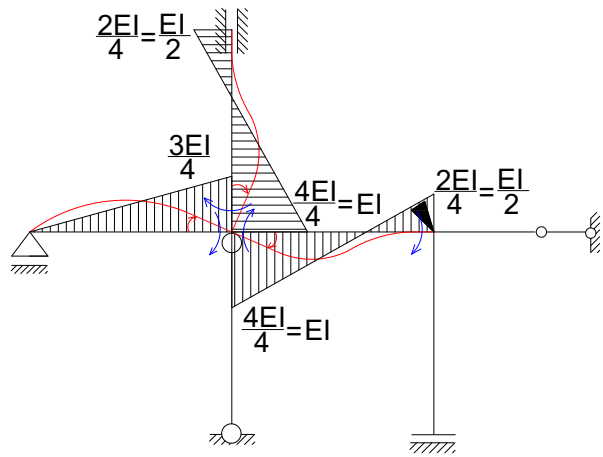
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$$M_{FL} = -\frac{EI}{2} \cdot \left(-\frac{20,037}{EI}\right) - EI \cdot \left(\frac{15,481}{EI}\right) - \frac{32}{3} = -16,13 kNm$$

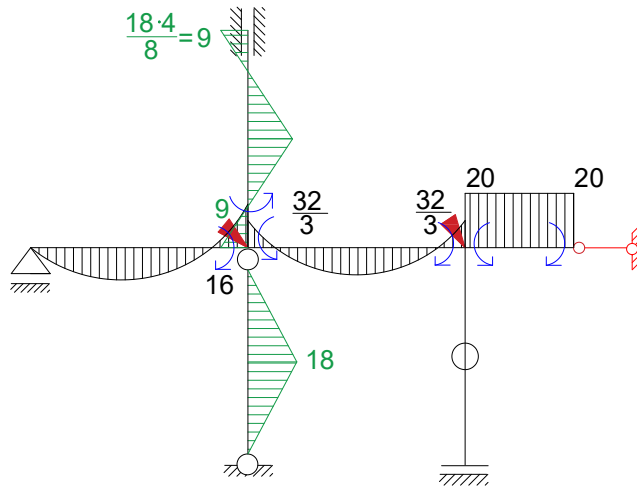




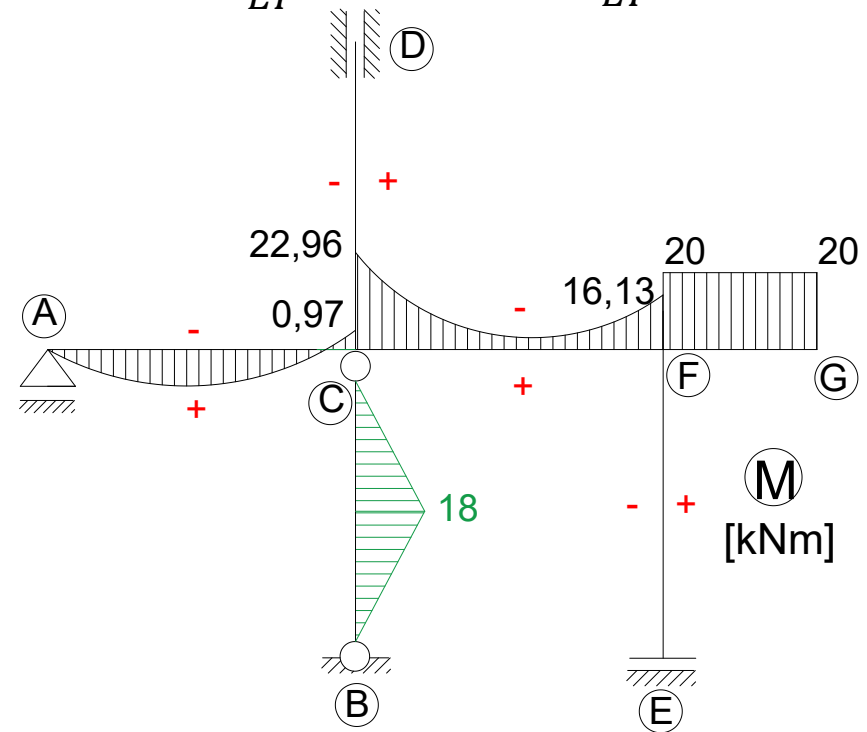
$$\varphi_1 = -\frac{20,037}{EI}$$

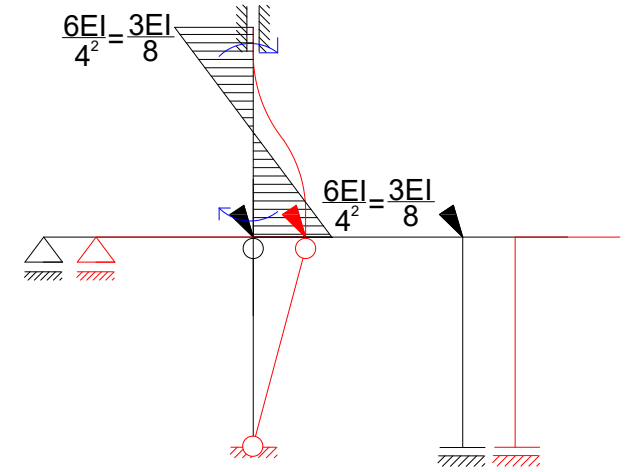
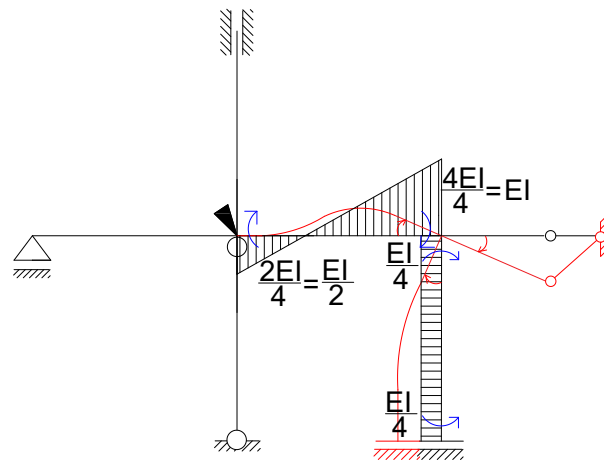
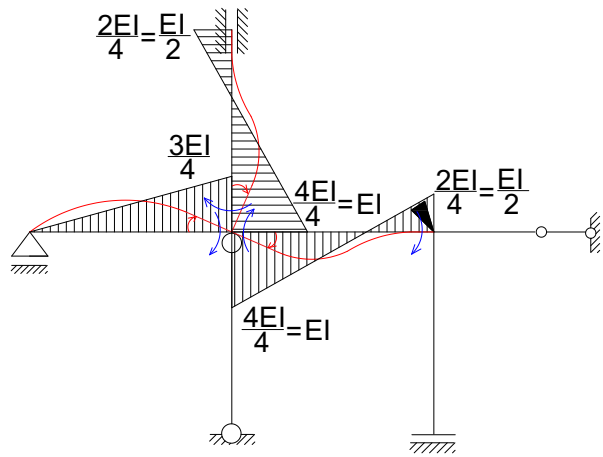
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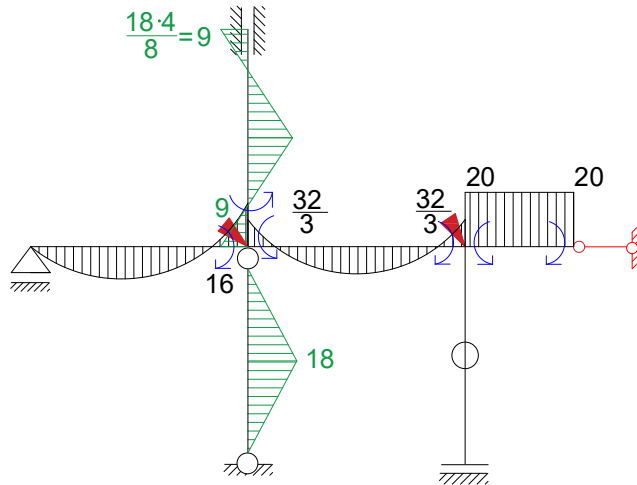




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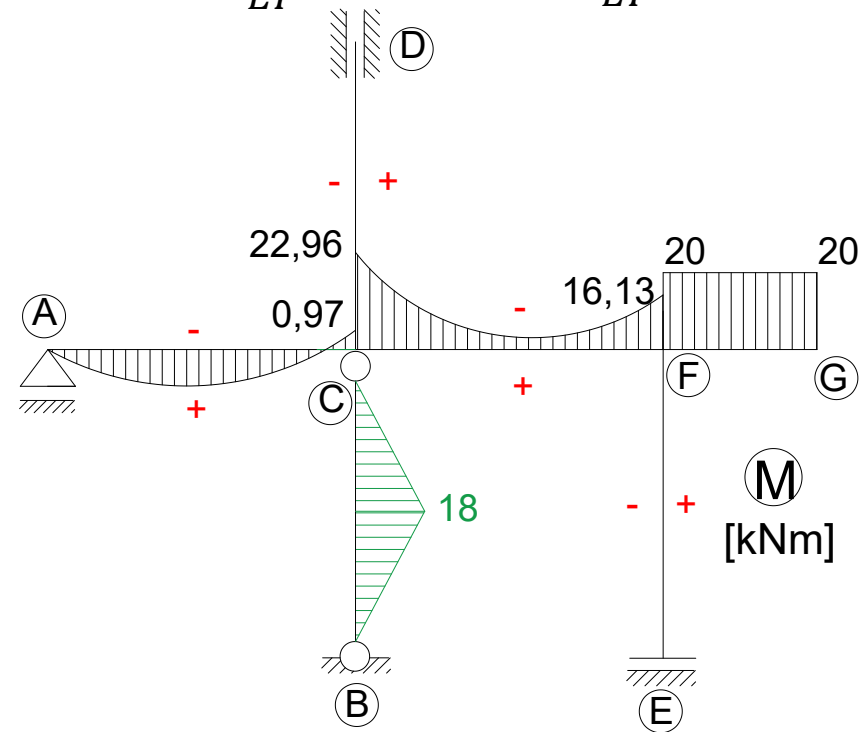
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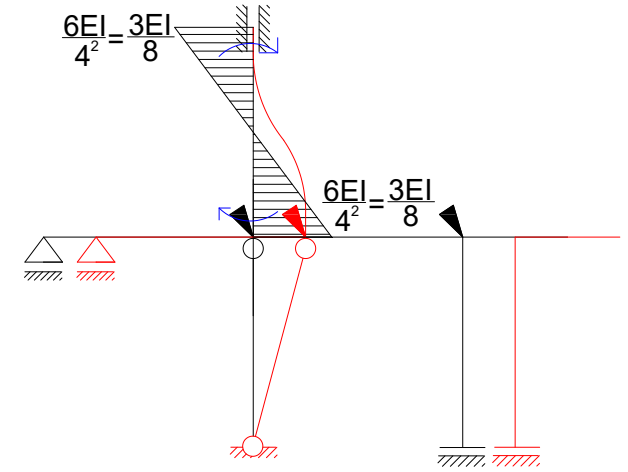
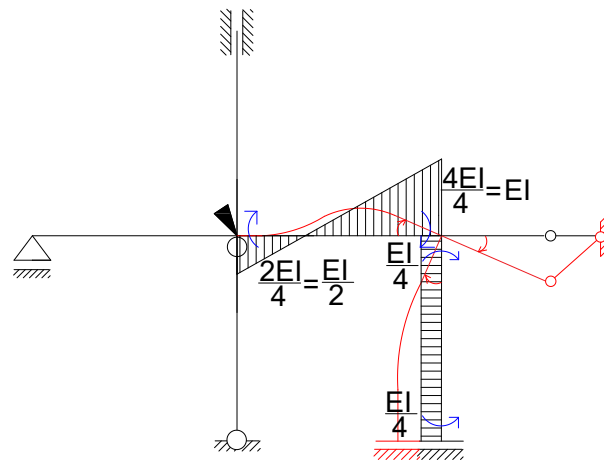
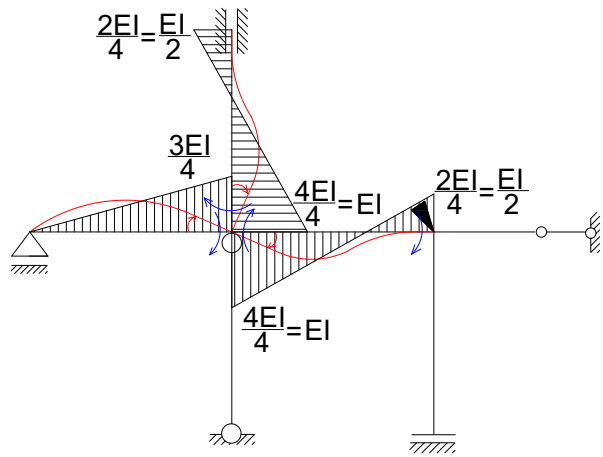
$$\Delta_3 = \frac{136,074}{EI}$$



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

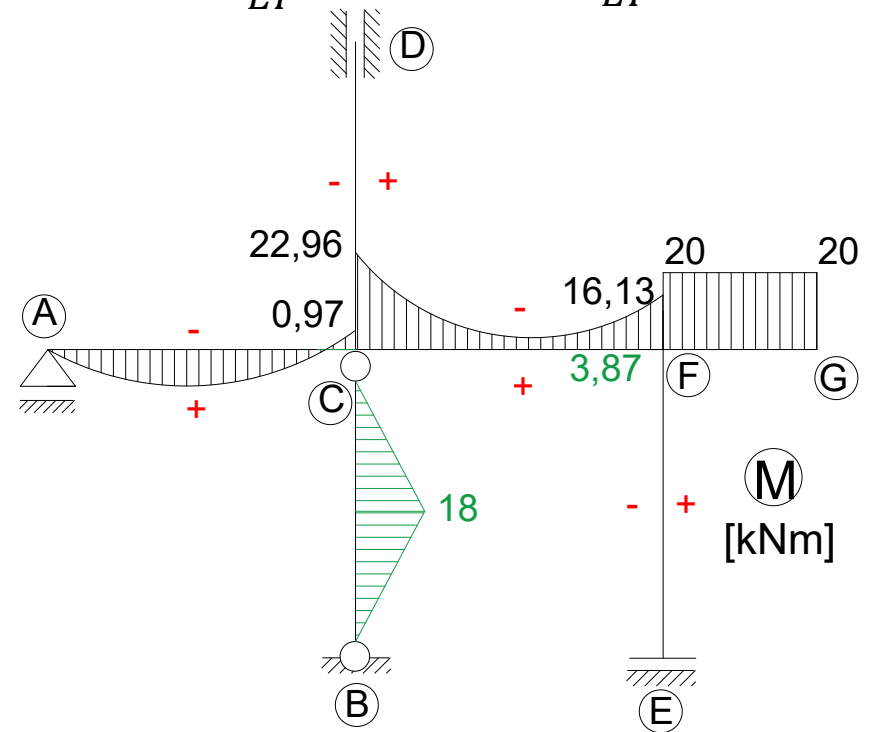
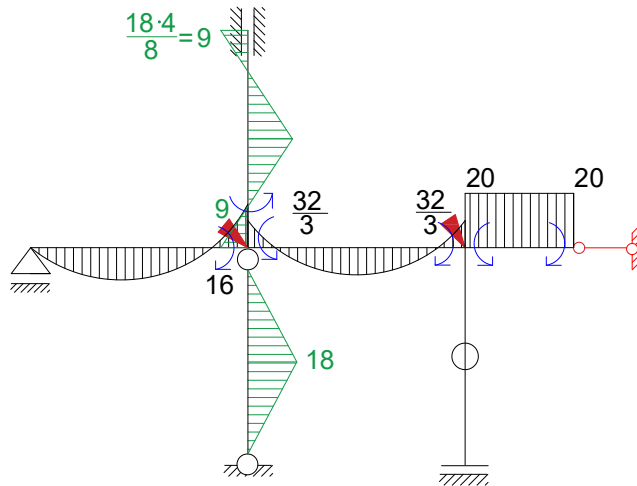




$$\varphi_1 = -\frac{20,037}{EI}$$

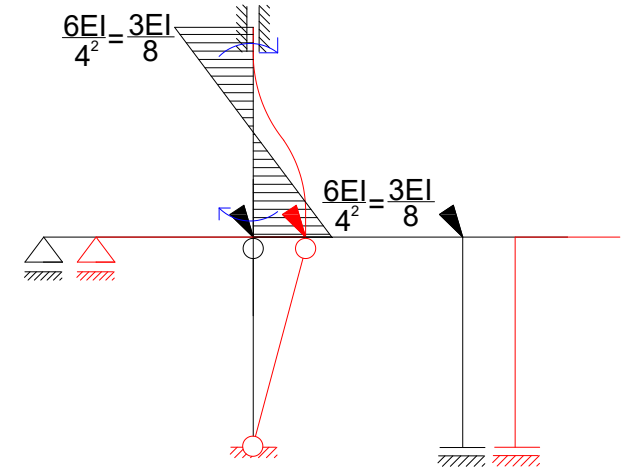
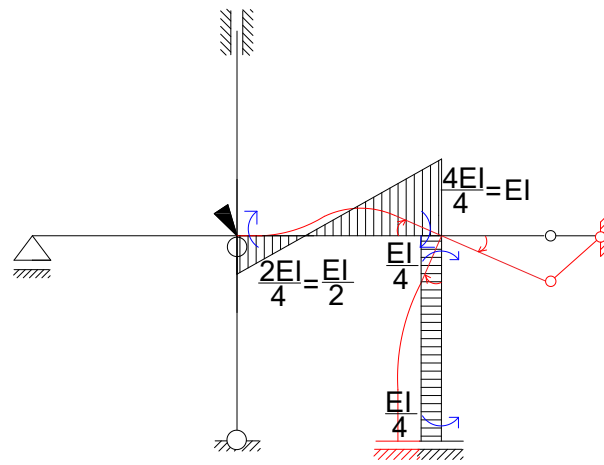
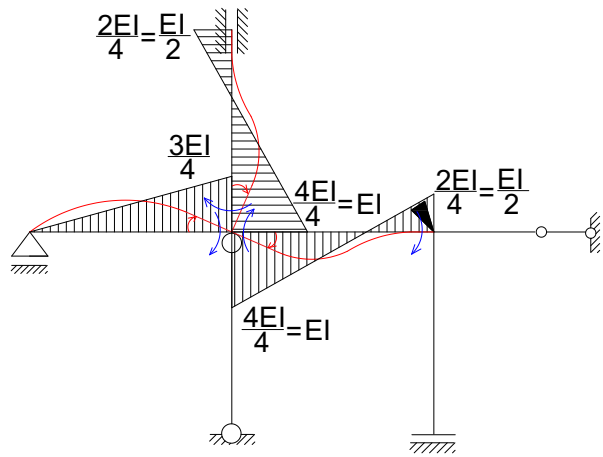
$$\varphi_2 = \frac{15,481}{EI}$$

$$\Delta_3 = \frac{136,074}{EI}$$



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

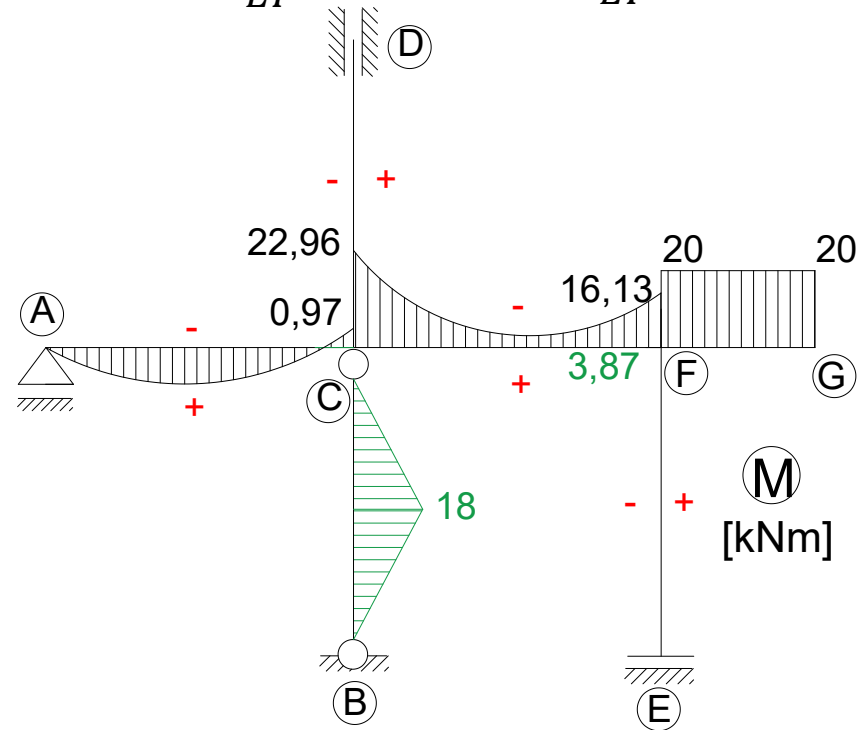
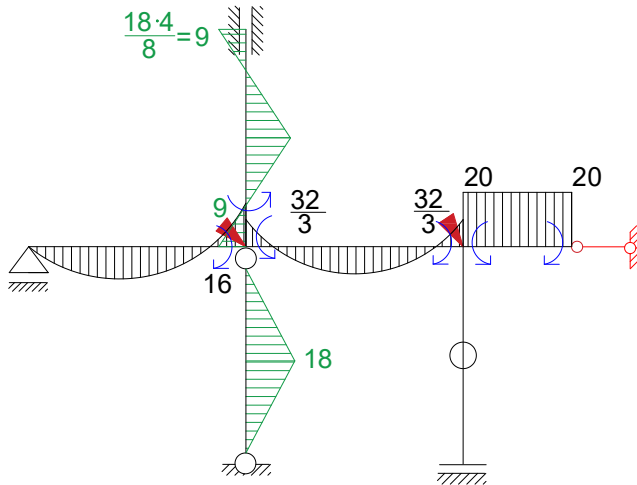
$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

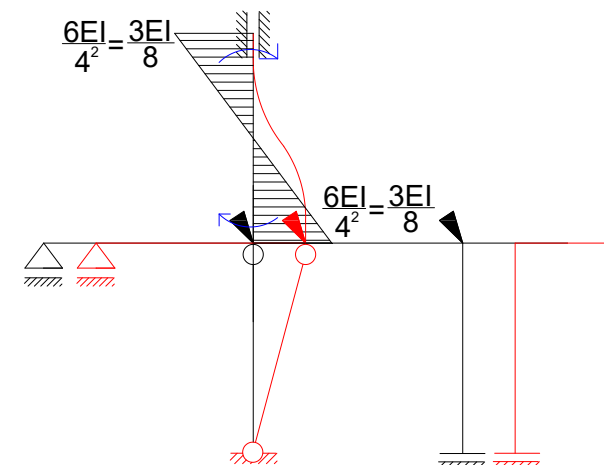
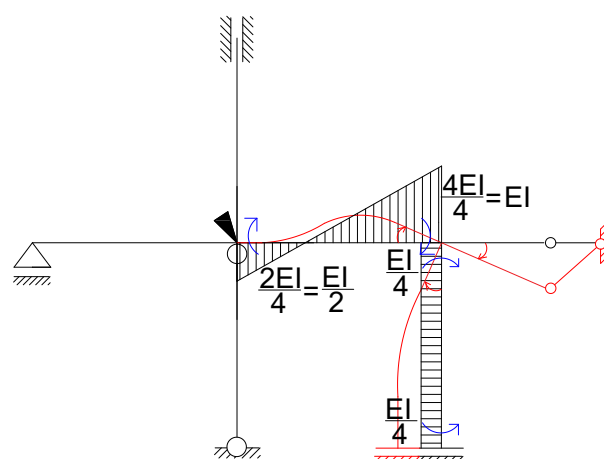
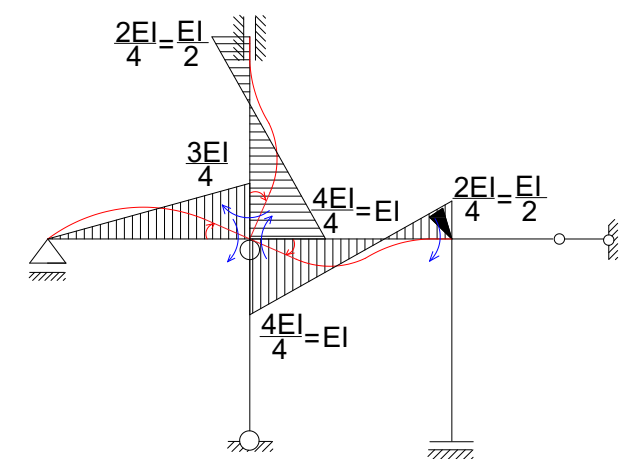
$$\Delta_3 = \frac{136,074}{EI}$$



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

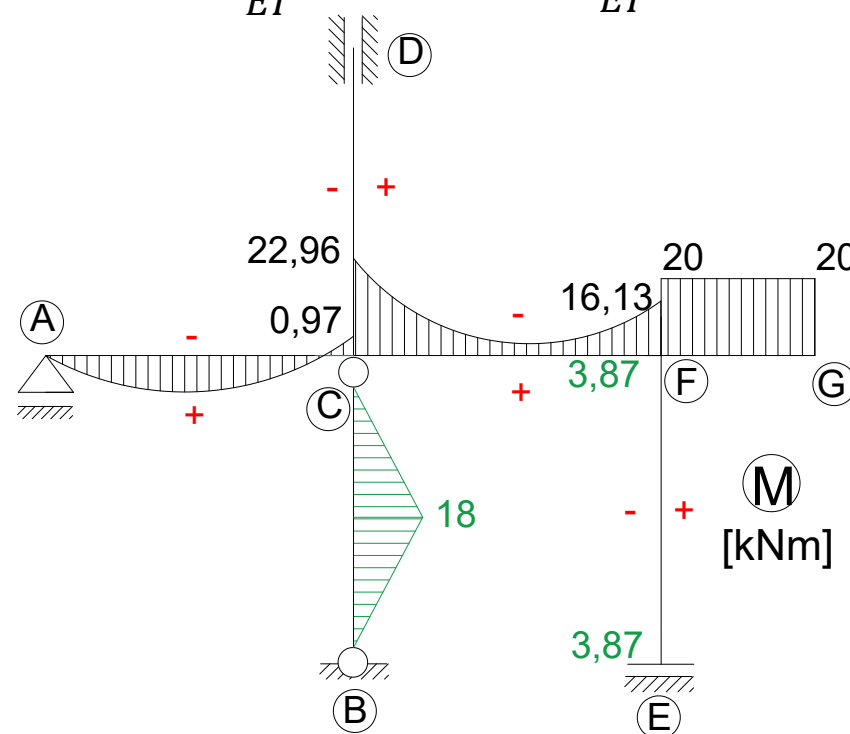
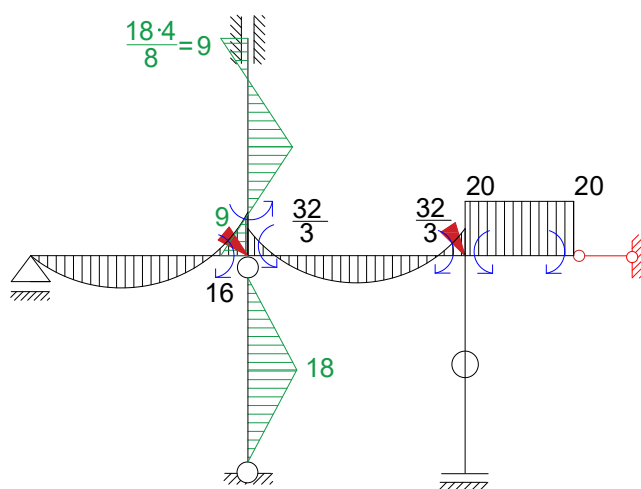
$$M_E = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

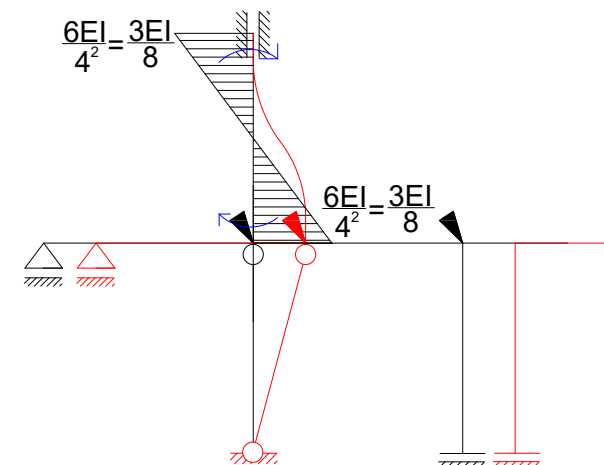
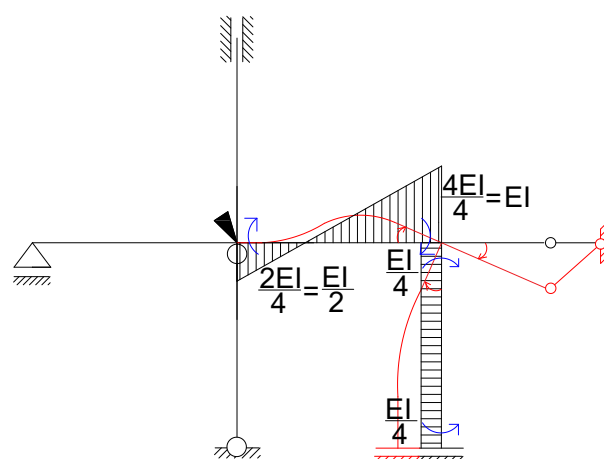
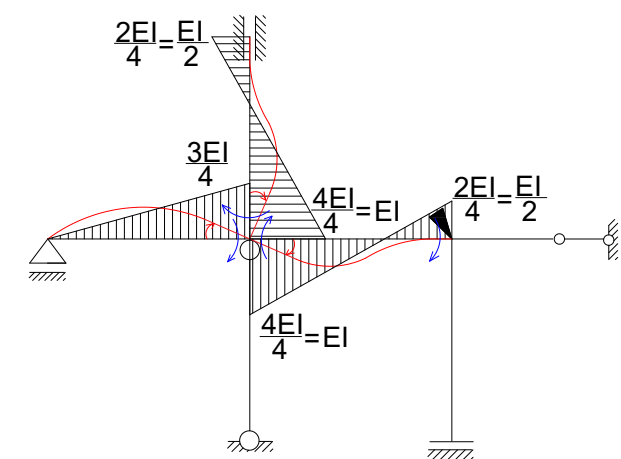
$$\Delta_3 = \frac{136,074}{EI}$$



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

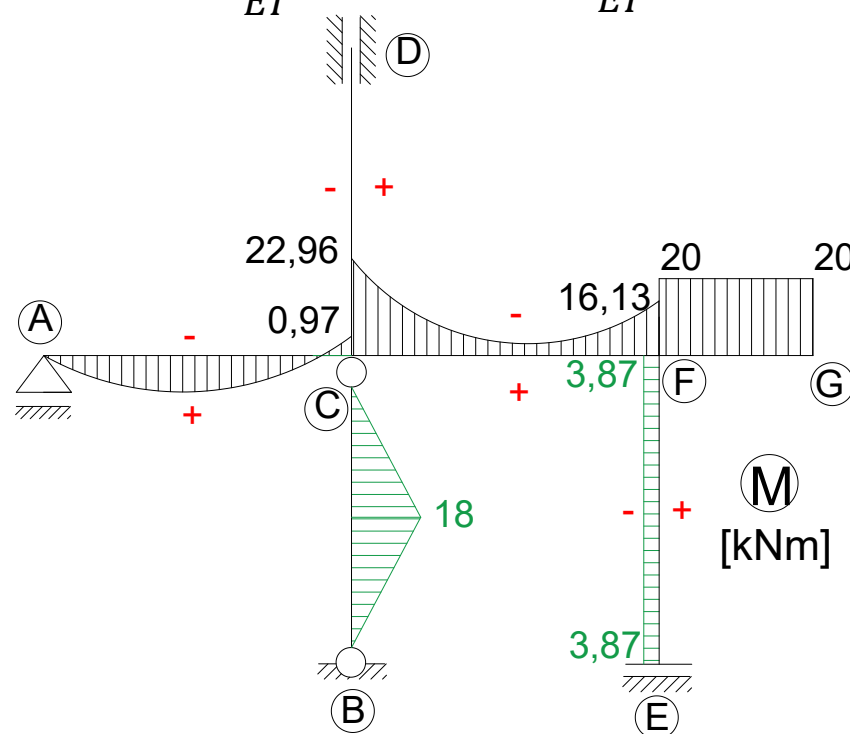
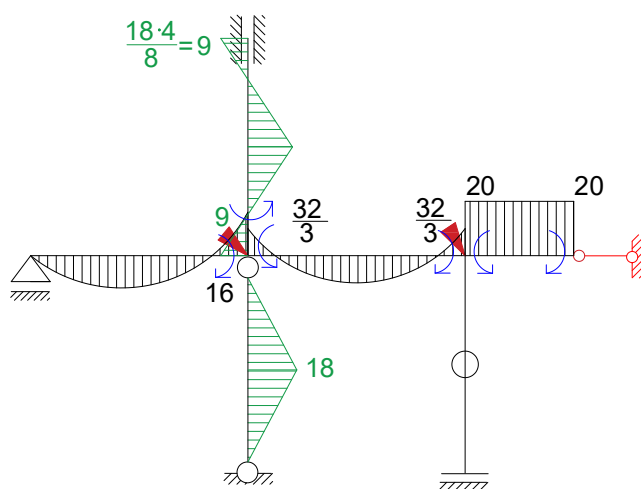
$$M_E = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

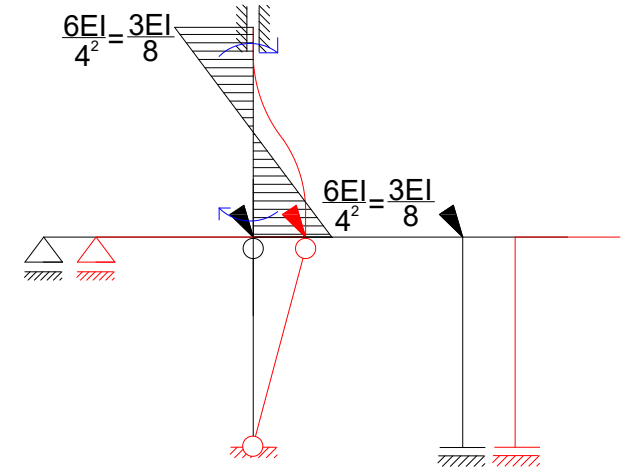
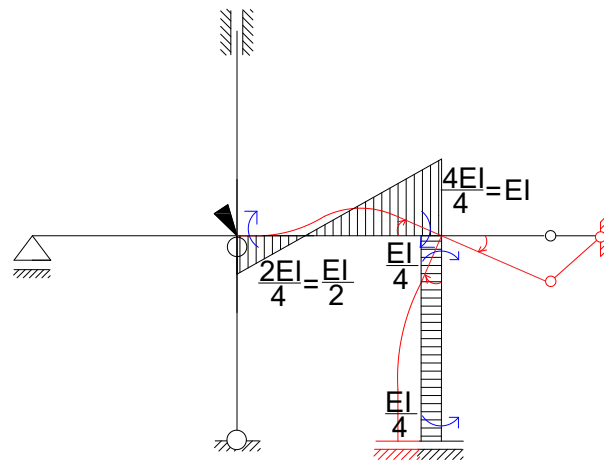
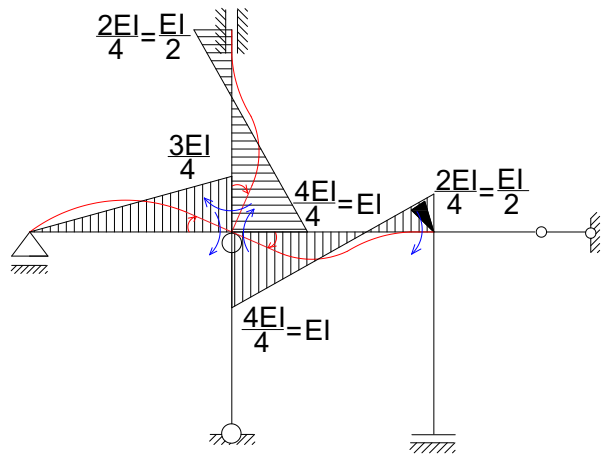
$$\Delta_3 = \frac{136,074}{EI}$$



$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

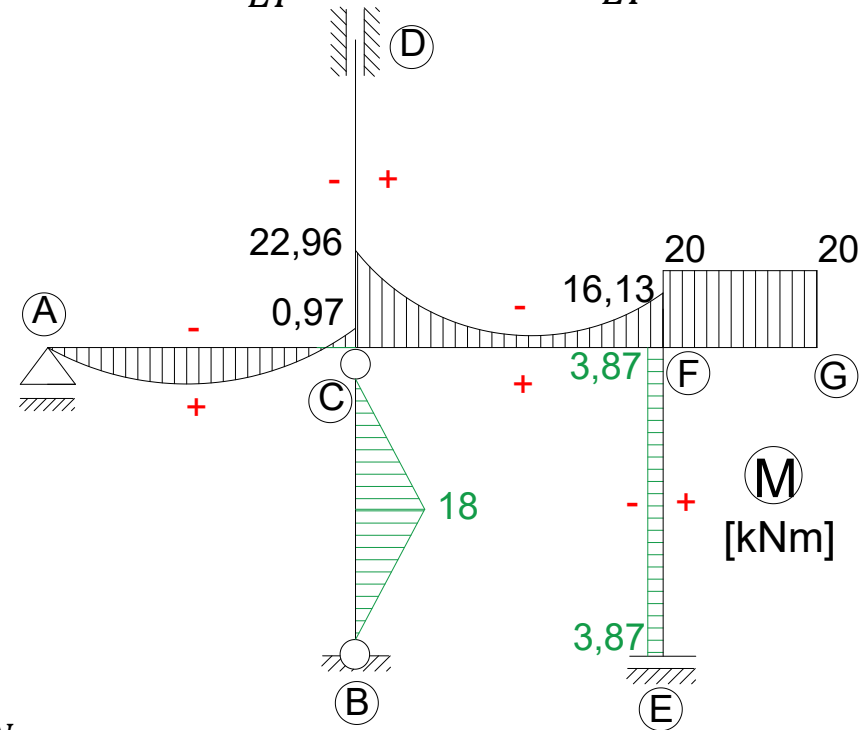
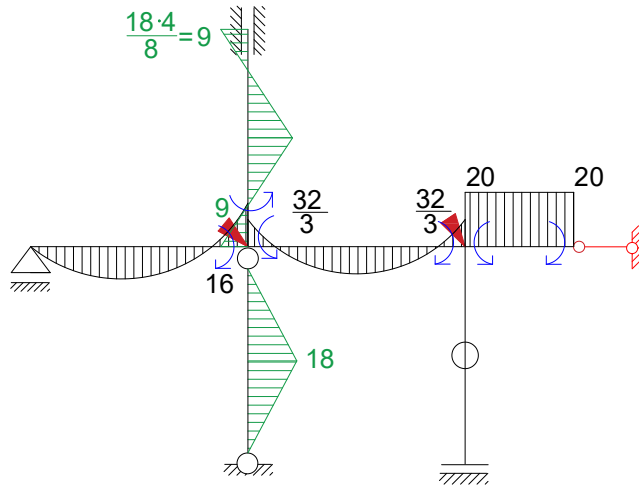
$$M_E = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

$$\Delta_3 = \frac{136,074}{EI}$$

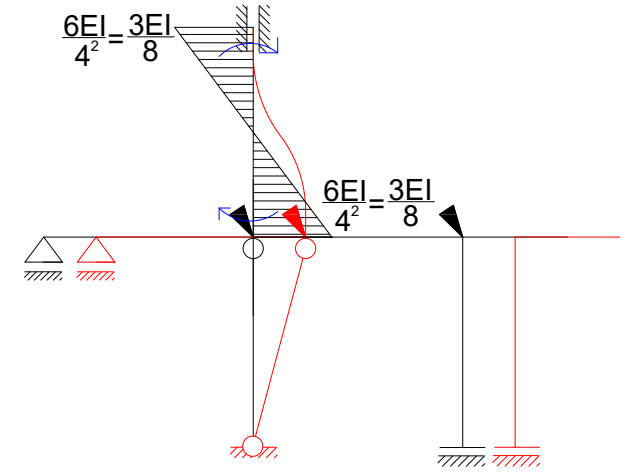
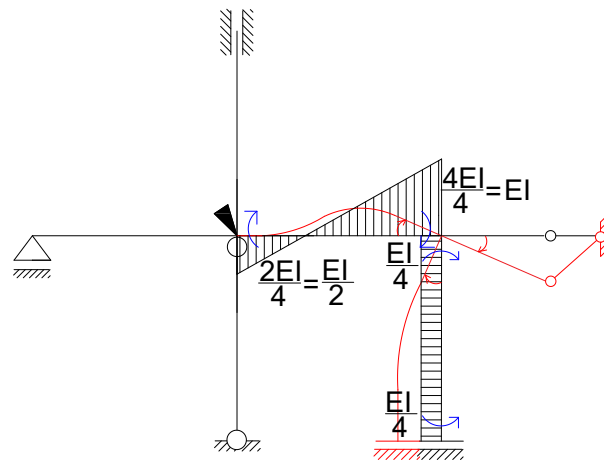
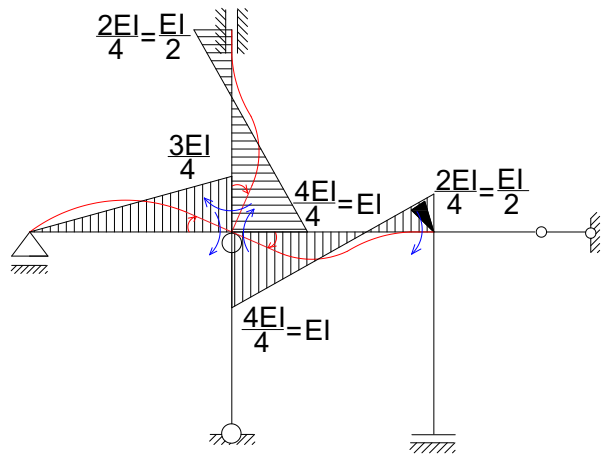


$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

$$M_E = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

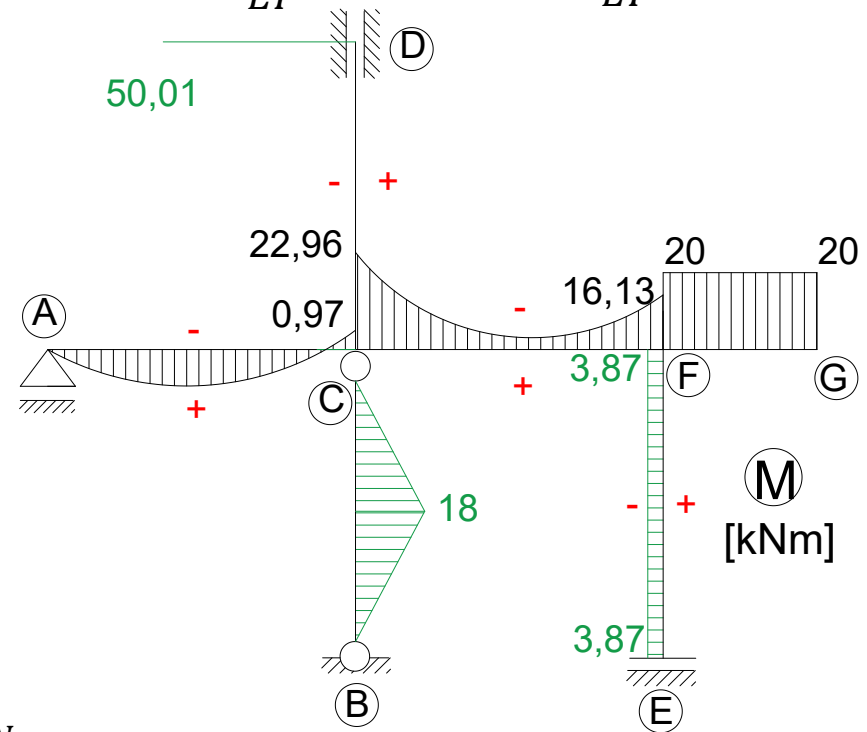
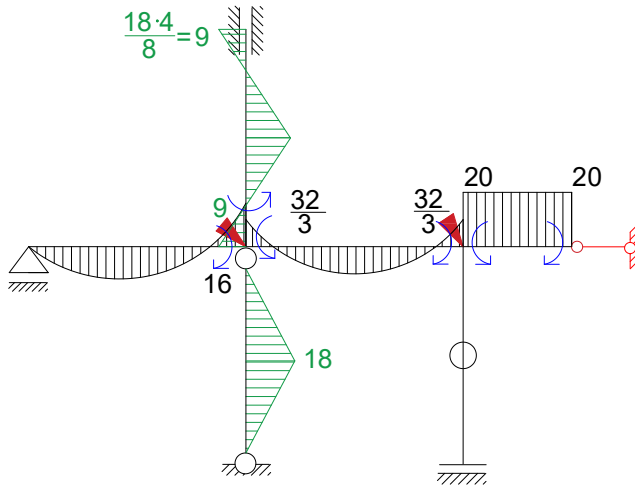
$$M_D = -\frac{EI}{2} \cdot \left(-\frac{20,037}{EI} \right) - \frac{3EI}{8} \cdot \left(\frac{136,074}{EI} \right) - 9 = -50,01 \text{ kNm}$$



$$\varphi_1 = -\frac{20,037}{EI}$$

$$\varphi_2 = \frac{15,481}{EI}$$

$$\Delta_3 = \frac{136,074}{EI}$$

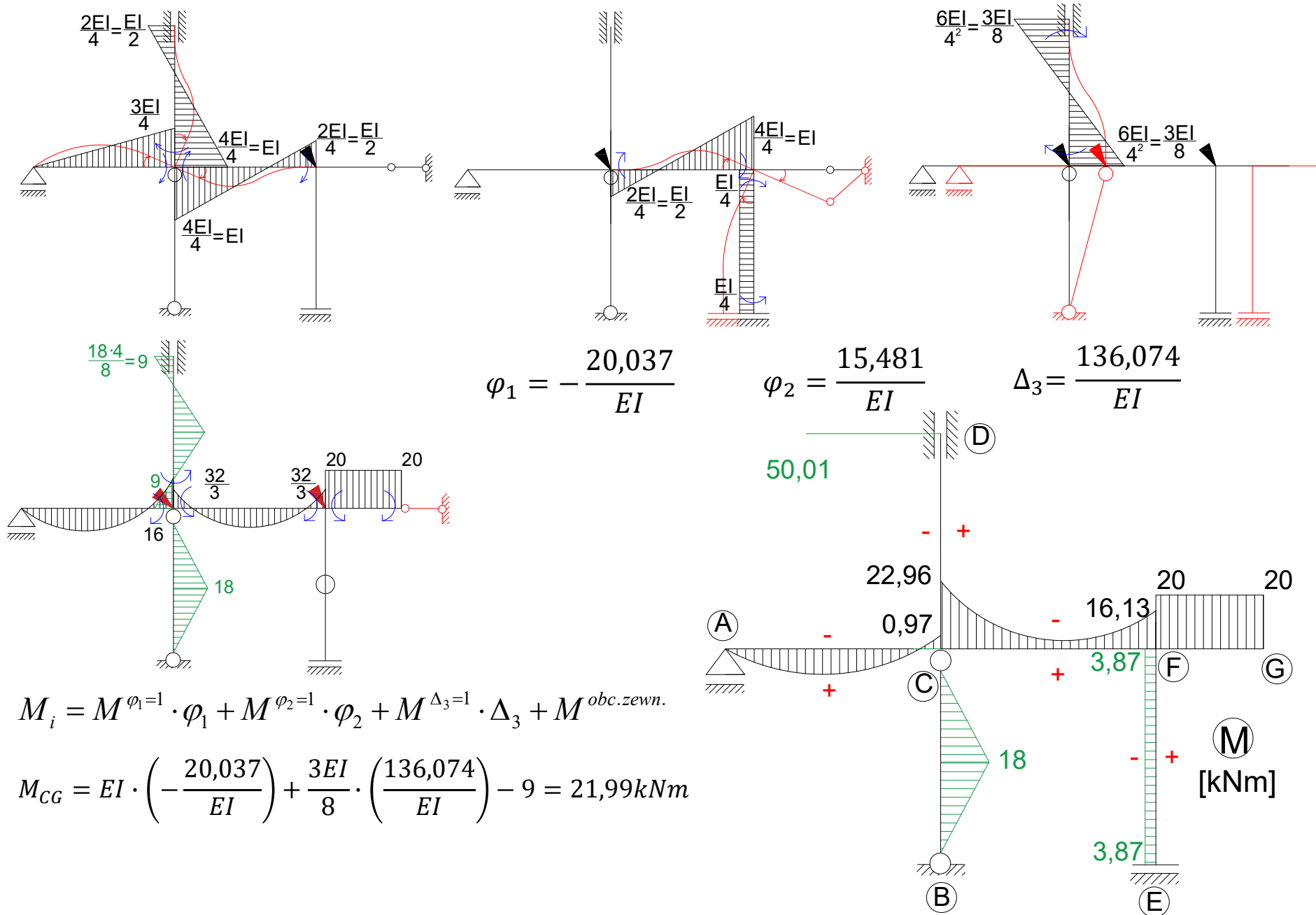


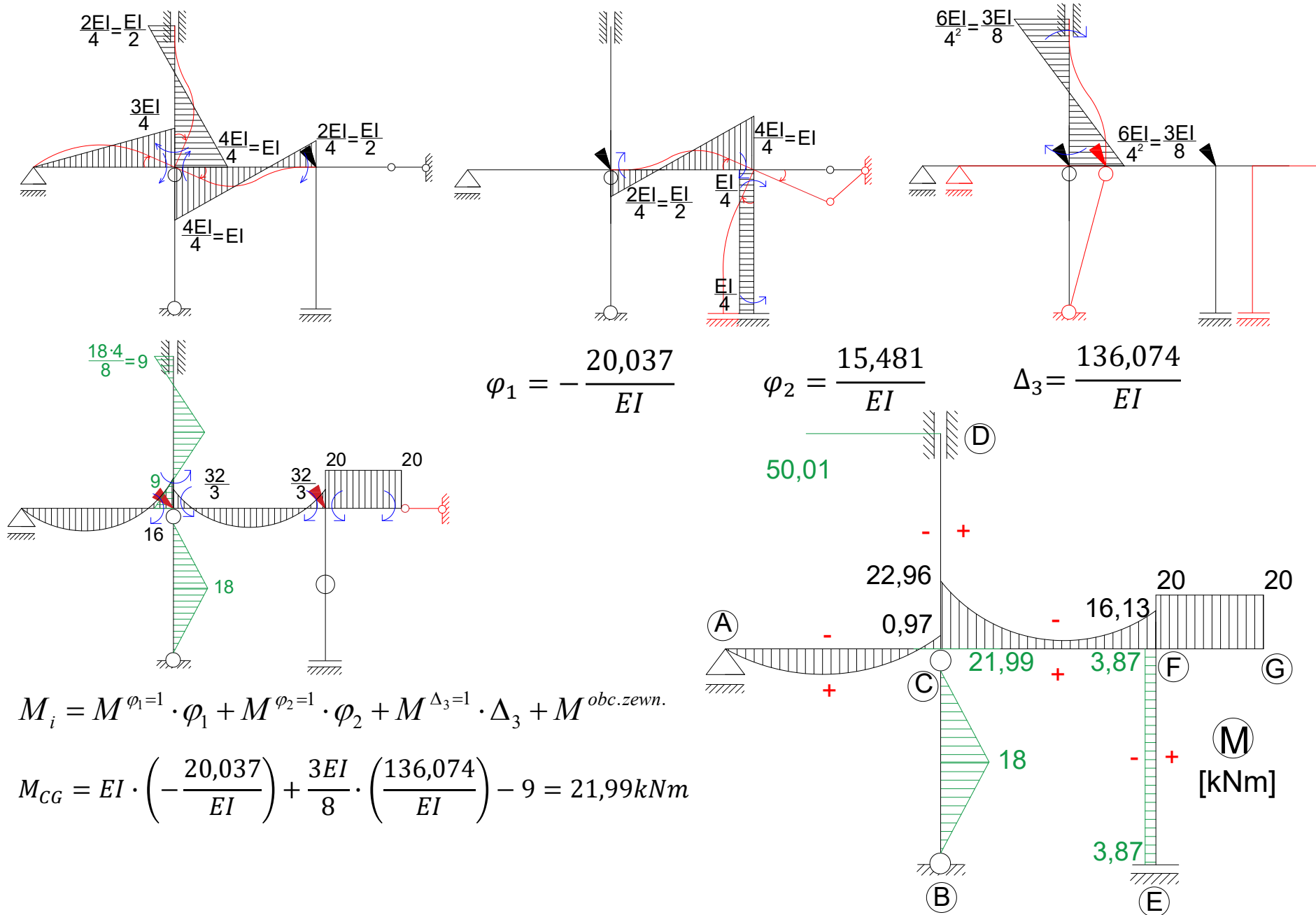
$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

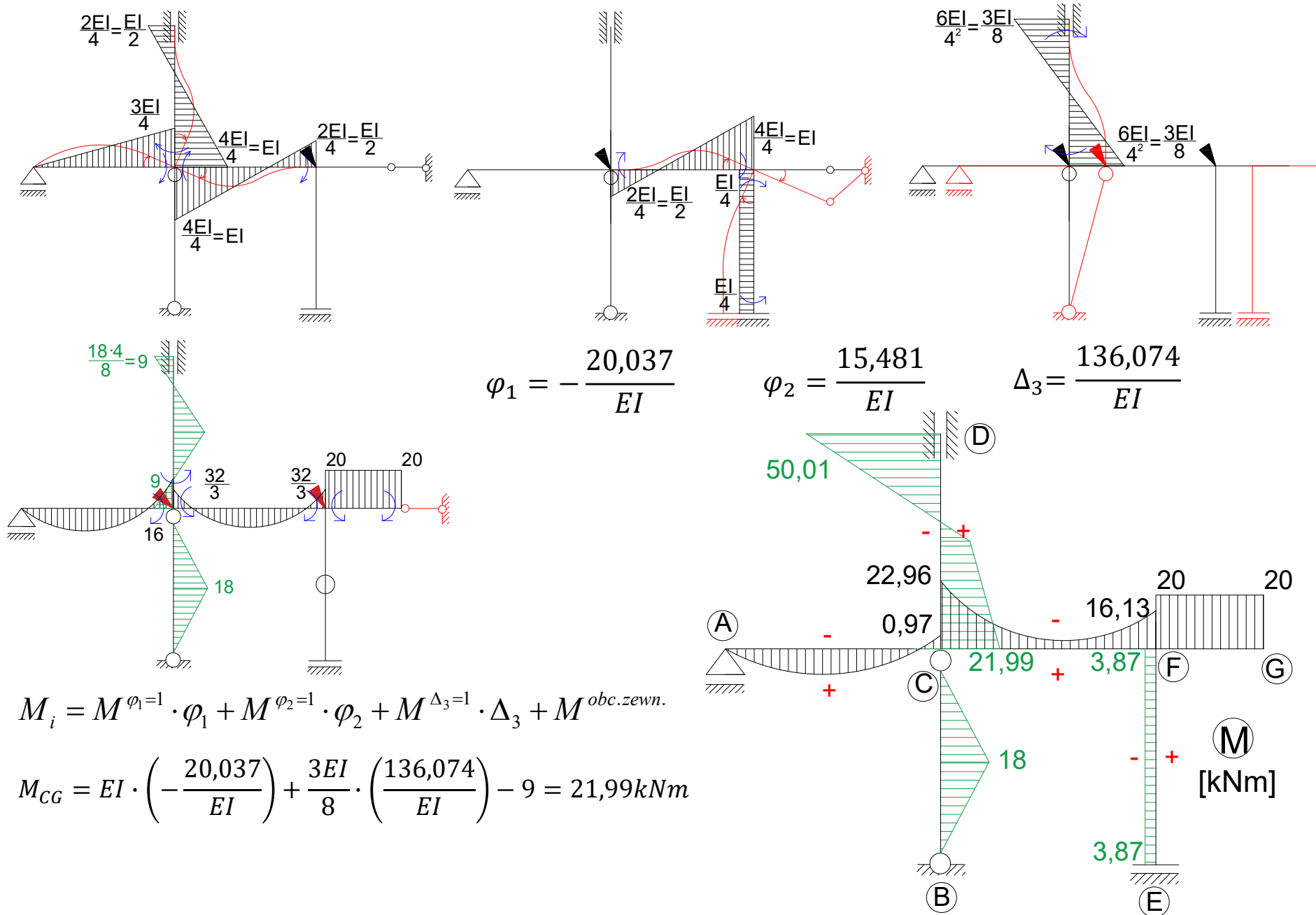
$$M_{Fd} = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

$$M_E = -\frac{EI}{4} \cdot \left(\frac{15,481}{EI} \right) = -3,87 \text{ kNm}$$

$$M_D = -\frac{EI}{2} \cdot \left(-\frac{20,037}{EI} \right) - \frac{3EI}{8} \cdot \left(\frac{136,074}{EI} \right) - 9 = -50,01 \text{ kNm}$$







$$M_i = M^{\varphi_1=1} \cdot \varphi_1 + M^{\varphi_2=1} \cdot \varphi_2 + M^{\Delta_3=1} \cdot \Delta_3 + M^{obc.zewn.}$$

$$M_{CG} = EI \cdot \left(-\frac{20,037}{EI} \right) + \frac{3EI}{8} \cdot \left(\frac{136,074}{EI} \right) - 9 = 21,99 \text{ kNm}$$