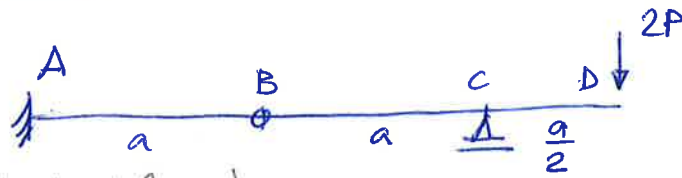
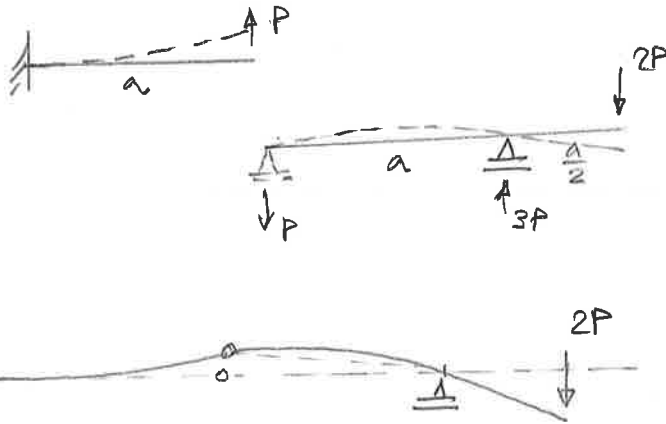


Ex. Sist. Barr.

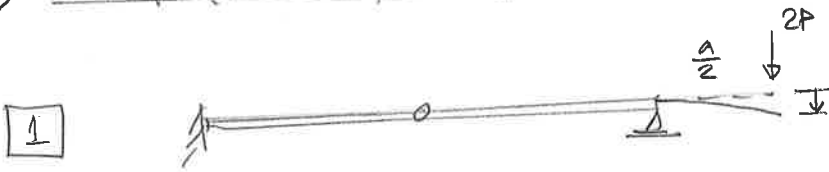
Determine φ_B^e , φ_B^d e v_D



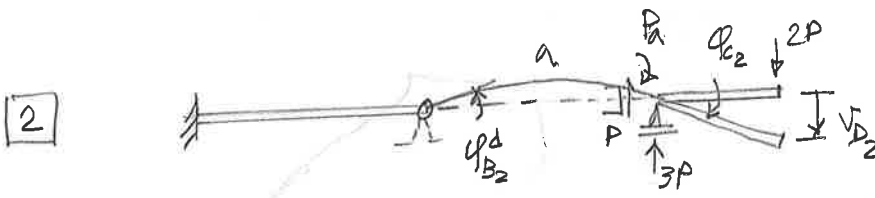
a) traçado da deformada



b) decomposição da flexão



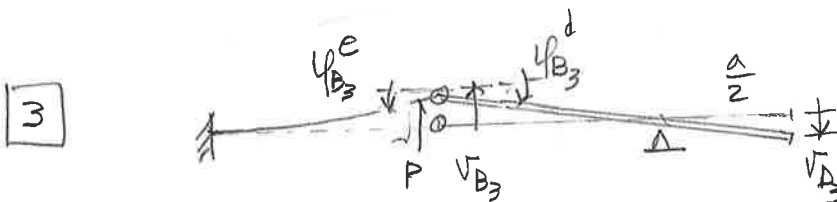
$$v_{D_1} = \frac{2P \left(\frac{a}{2}\right)^3}{3EI} = \frac{Pa^3}{12EI} \checkmark$$



$$\varphi_{B_2}^d = \frac{(Pa) \times a}{6EI} = \frac{Pa^2}{6EI}$$

$$\varphi_{C_2} = \frac{(Pa) \times a}{3EI} = \frac{Pa^2}{3EI}$$

$$v_{D_2} = \varphi_{C_2} \times \frac{a}{2} = \frac{Pa^2}{6EI}$$



$$\varphi_{B_3}^e = \frac{Pa^2}{2EI}$$

$$v_{B_3} = \frac{Pa^3}{3EI}$$

$$\varphi_{B_3}^d = \frac{v_{B_3}}{a} = \frac{Pa^2}{3EI}$$

$$v_{D_3} = \varphi_{B_3}^d \times \frac{a}{2} = \frac{Pa^3}{6EI}$$

$$\varphi_B^e - \varphi_{B_3}^e = -\frac{Pa^2}{2EI} \quad (\uparrow)$$

$$\varphi_B^d = -\varphi_{B_2}^d + \varphi_{B_3}^d = \left(-\frac{1}{6} + \frac{1}{3}\right) \frac{Pa^2}{3EI} = \frac{Pa^2}{6EI} \quad (\downarrow)$$

$$v_D = v_{D_1} + v_{D_2} + v_{D_3}$$

$$= \frac{Pa^3}{EI} \left(\frac{1}{12} + \frac{1}{6} + \frac{1}{6}\right) = \frac{5Pa^3}{12EI} \quad (\downarrow)$$