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(%i81) a:0.8$
      b:0.4$
      d1:2*0.02$
      d2:0.02$
      nu:0.3$
      F1:2500$
      E1:5000000000$
      E2:4-E1$
      M1:-500$
      p0:-5000$
      L1:a$
      L2:b$
      I1:(d1)^4-pi/64$
      I2:(d2)^4-pi/64$

(%i84) k(l,e,L):=l-e/L^3$
      k1:k(I1,E1,L1);
      k2:k(I2,E2,L2);

(k1) 3906.249999999999 pi
(k2) 7812.499999999998 pi

(%i85) K:matrix([12,6*L,-12,6*L],[6*L,4*L^2,-6*L,2*L^2],[-12,-6*L,12,-6*L],[6*L,2*L^2,-6*L,4*L^2])$

(%i87) K1:float(k1-subst(L=L1,K))$

(%i89) K2:float(k2-subst(L=L2,K))$

(%i96) elem1:matrix([1],[2],[3],[4])$
      elem2:matrix([3],[4],[5],[6])$

(%i93) KG:zeromatrix(6,6)$

(%i97) for i:1 thru 4 do
      for j:1 thru 4 do
          (KG[elem1[i,1],elem1[j,1]]:KG[elem1[i,1],elem1[j,1]]+K1[i,j],
          KG[elem2[i,1],elem2[j,1]]:KG[elem2[i,1],elem2[j,1]]+K2[i,j]);

(%o97) done

(%i100) float(KG)$

(%i101) KGred:float(submatrix(1,2,5,KG,1,2,5))$

(%i109) U:matrix([0],[0],[v2],[theta],[0],[theta])$

(%i104) F:matrix([Fa+p0-L1/2],[Ma+p0-L1^2/12],[F1+p0-L1/2],[-p0-L1^2/12],[Fb],[M1])$

(%i106) Fred:submatrix(1,2,5,F)$

(%i127) Ured:first(linsolve_by_lu(KGred,Fred));
rat: replaced 441786.4669110646 by 9279282951/21004 = 441786.4669110646
rat: replaced 441786.4669110646 by 9279282951/21004 = 441786.4669110646
rat: replaced 47123.8898038469 by 6186188634/131275 = 47123.88980384688
(Ured) 
$$\begin{bmatrix} 0.0135812218105084 \\ 0.02122065907891938 \\ -0.09337089994724528 \end{bmatrix}$$


(%i123) U[3,1]:Ured[1,1]$
      U[4,1]:Ured[2,1]$
      U[6,1]:Ured[3,1]$

(%i125) KG.U;

(%o125) 
$$\begin{bmatrix} -750.0 \\ -466.6666666666668 \\ 500.0 \\ 266.6666666666666 \\ 250.0 \\ -500.0 \end{bmatrix}$$


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