Force analysis via dyads

{AB → 0.14, AC → 0.06, CF → 0.25, h → 0.01, d → 0.01, hSlider → 0.02, wSlider → 0.05,
ro → 8000, g → 9.807, Me → 1000., phi[t] → 1.0472, phi′[t] → 52.3599, phi″[t] → 0}

Inertia forces and moments

Link 1

m1 = ro AB h d = 0.112 [kg]

IC1 = m1 (AB^2+h^2)/12 = 0.000183867 [kg m^2]

Fin1 = −m1 aC1 = {10.7469, 18.6142, 0} [N]

F1 = Fin1 + G1 = {10.7469, 17.5158, 0} [N]

Min1 = M1 = −IC1 alpha10 = {0, 0, 0} [N m]

Link 2

m2 = ro hSlider wSlider d = 0.08 [kg]

IC2 = m2 (hSlider^2+wSlider^2)/12 = 0.0000193333 [kg m^2]

Fin2 = −m2 aC2 = {15.3527, 26.5917, 0} [N]

F2 = Fin2 + G2 = {15.3527, 25.8071, 0} [N]

Min2 = M2 = −IC2 alpha20 = {0, 0, −0.0475952} [N m]

Link 3

m3 = ro CF h d = 0.2 [kg]

IC3 = m3 (CF^2+h^2)/12 = 0.00104333 [kg m^2]

Fin3 = −m3 aC3 = {145.238, 45.2941, 0} [N]

F3 = Fin3 + G3 = {145.238, 43.3327, 0} [N]

Min3 = M3 = −IC3 alpha30 ={0, 0, −2.5685} [N m]

M3e = −Sign[omega2]{ 0, 0, Me } = {0, 0, −1000.} [N m]

Joint reactions

Dyad: B_R, B_T, C_R

Sum F for 2 & 3: F03 + F3 + F2 + F12 = 0

(x): 160.591 + F03x + F12x=0 (1)

(y): 69.1398 + F03y + F12y=0 (2)

Sum M for 2 & 3 wrt B: rBC x F03 + rBC3 x F3 + M3 + M3e + M2 = 0

(z): −1004.63 + 0.0612436 F03x − 0.07 F03y=0 (3)

Sum F for 3 projected upon BC: (F03+F3).rBC = 0

−0.07 (145.238 + F03x) − 0.0612436 (43.3327 + F03y)=0 (4)

From Eqs.(1)(2)(3)(4) => F03x, F03y, F12x, F12y

F03 = {F03x, F03y, 0} = {7008.6, −8220.01, 0} [N]

F12 = {F12x, F12y, 0} = {−7169.19, 8150.87, 0} [N]

Link 2

Sum F for 2: F32 + F2 + F12 = 0 <=> F32 = − F2 − F12

F32 = {7153.84, −8176.68, 0} [N]

point Q is on BC: (yB−yC)/(xB−xC)=(yQ−yC)/(xQ−xC) =>

$$0.874908 - \frac{-0.06 + yQ}{xQ} = 0 \quad (5)$$

Sum M for 2 wrt B: rBQ x F32 + M2 = 0

(z): 1439.68 − 8176.68 xQ − 7153.84 yQ=0 (6)

From Eqs.(5)(6) => xQ, yQ

rQ = {xQ, yQ, 0} = {0.0699967, 0.121241, 0} [m]

Link 1

Sum F for link 1: F1 + F21 + F01 = 0 <=> F01 = − F21 − F1

F01 = {−7179.94, 8133.35, 0} [N]

Sum M for 1 wrt C1: C1B x F21 + C1A x F01 + M1 + Mm = 0 <=>

Mm = − (C1B x F21 + C1A x F01 + M1)

Mm = {0., 0., 1439.82} [Nm]