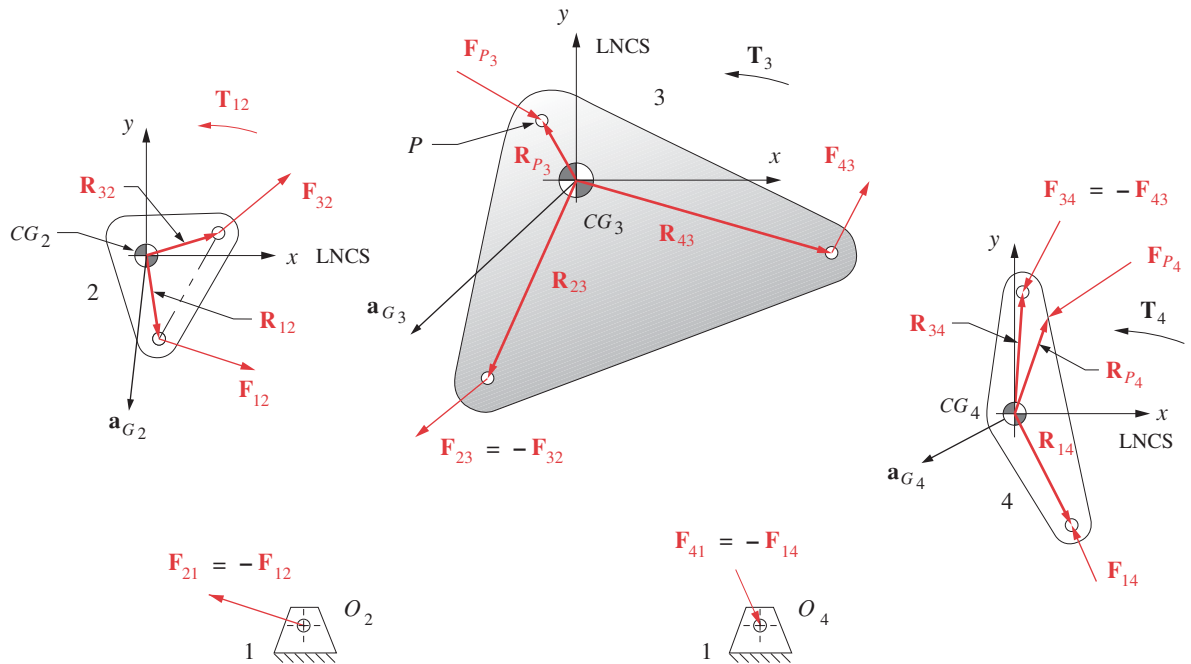(a) The linkage and dimensions

(b) Free-body diagrams

FIGURE P11-2

Linkage geometry and free-body diagrams for Problems 11-5 to 11-6

Table P11-3 is on the next page. See the text for problem statement.

TABLE P11-3 Data for Problems 11-5 and 11-7

Part 1 — Lengths in inches, angles in degrees, angular acceleration in rad/sec²

Row	link 2	link 3	link 4	link 1	θ_2	θ_3	θ_4	α_2	α_3	α_4
a.	4	12	8	15	45	24.97	99.30	20	75.29	244.43
b.	3	10	12	6	30	90.15	106.60	−5	140.96	161.75
c.	5	15	14	2	260	128.70	151.03	15	78.78	53.37
d.	6	19	16	10	−75	91.82	124.44	−10	−214.84	−251.82
e.	2	8	7	9	135	34.02	122.71	25	71.54	−14.19
f.	17	35	23	4	120	348.08	19.01	−20	−101.63	−150.86
g.	7	25	10	19	100	4.42	61.90	−15	−17.38	−168.99

Part 2 — Angular velocity in rad/sec, mass in blobs, moment of Inertia in blob-in², torque in lb-in

Row	ω_2	ω_3	ω_4	m_2	m_3	m_4	I_2	I_3	I_4	T_3	T_4
a.	20	−5.62	3.56	0.002	0.02	0.10	0.10	0.20	0.50	−15	25
b.	10	−10.31	−7.66	0.050	0.10	0.20	0.20	0.40	0.40	12	0
c.	20	16.60	14.13	0.010	0.02	0.05	0.05	0.10	0.13	−10	20
d.	20	3.90	−3.17	0.006	0.15	0.07	0.12	0.30	0.15	0	30
e.	20	1.06	5.61	0.001	0.04	0.09	0.30	0.80	0.30	25	40
f.	20	18.55	21.40	0.150	0.30	0.25	0.24	0.60	0.92	0	−25
g.	20	4.10	16.53	0.080	0.20	0.12	0.45	0.90	0.54	0	0

Part 3 — Lengths in inches, angles in degrees, linear accelerations in inches/sec²

Row	R_{g_2} mag	R_{g_2} ang	R_{g_3} mag	R_{g_3} ang	R_{g_4} mag	R_{g_4} ang	a_{g_2} mag	a_{g_2} ang	a_{g_3} mag	a_{g_3} ang
a.	2	0	5	0	4	30	801.00	222.14	1 691.49	208.24
b.	1	20	4	−30	6	40	100.12	232.86	985.27	194.75
c.	3	−40	9	50	7	0	1 200.84	37.85	3 120.71	22.45
d.	3	120	12	60	6	−30	1 200.87	226.43	4 543.06	81.15
e.	0.5	30	3	75	2	−40	200.39	341.42	749.97	295.98
f.	6	45	15	135	10	25	2 403.00	347.86	12 064.20	310.22
g.	4	−45	10	225	4	45	1 601.12	237.15	2 562.10	−77.22

Part 4 — Linear accelerations in inches/sec², forces in lb, lengths in inches, angles in degrees

Row	a_{g_4} mag	a_{g_4} ang	F_{P_3} mag	δF_{P_3} ang	R_{P_3} mag	δR_{P_3} ang	F_{P_4} mag	δF_{P_4} ang	R_{P_4} mag	δR_{P_4} ang
a.	979.02	222.27	0	0	0	0	40	−30	8	0
b.	1 032.32	256.52	4	30	10	45	15	−55	12	0
c.	1 446.58	316.06	0	0	0	0	75	45	14	0
d.	1 510.34	2.15	2	45	15	180	20	270	16	0
e.	69.07	286.97	9	0	6	−60	16	60	7	0
f.	4 820.72	242.25	0	0	0	0	23	0	23	0
g.	1 284.55	−41.35	12	−60	9	120	32	20	10	0