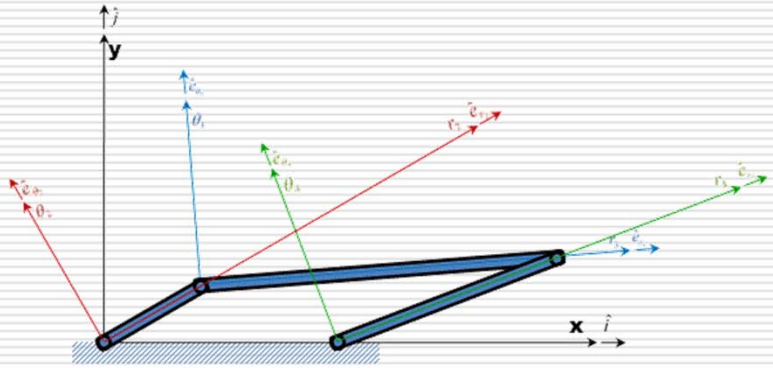
Kinematics Fundamentals

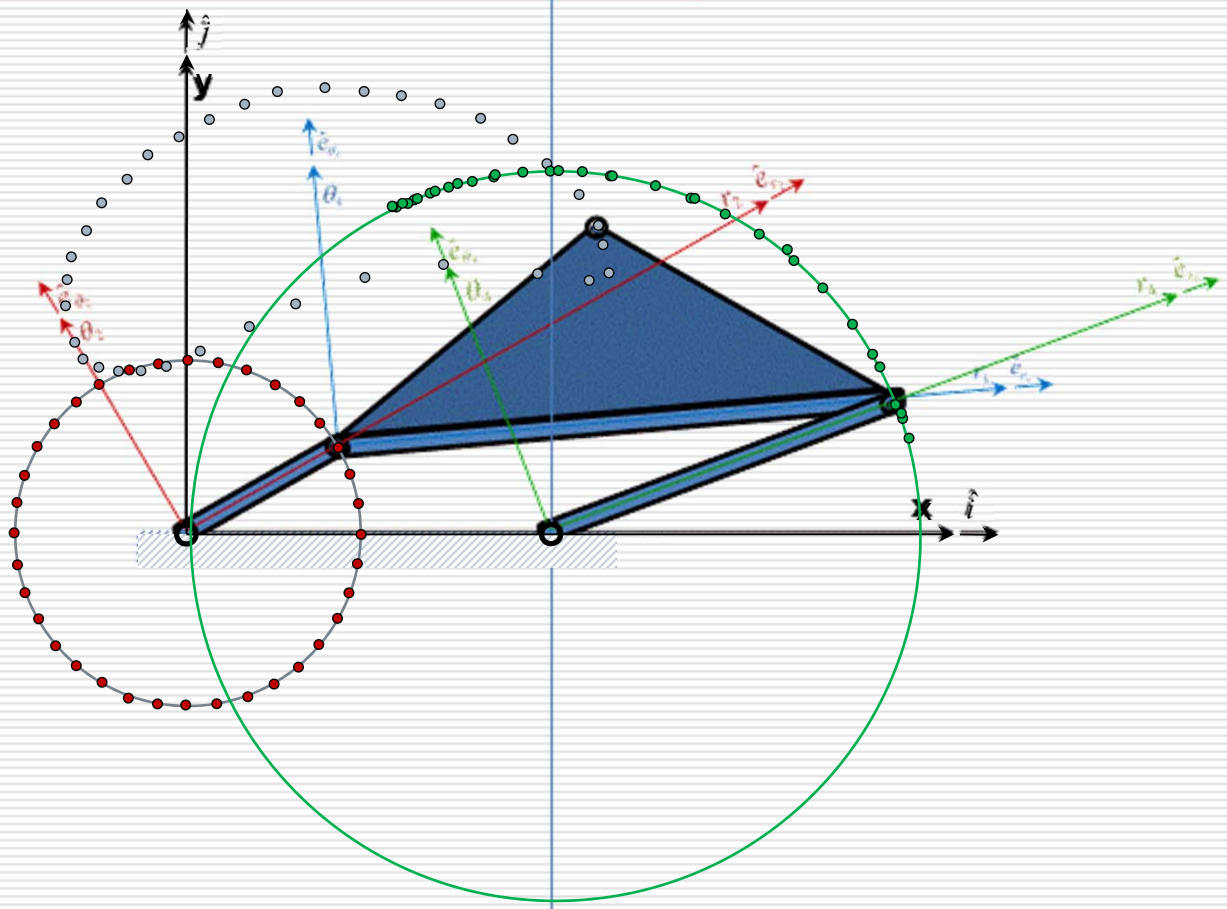
- Position Analysis
- Four Bar Linkage
- Slider Crank/Inverted Slider Crank
- Elliptic Trammel
- Rapson Slide

TYPE I (RRRR): 4-BAR ANAMATION

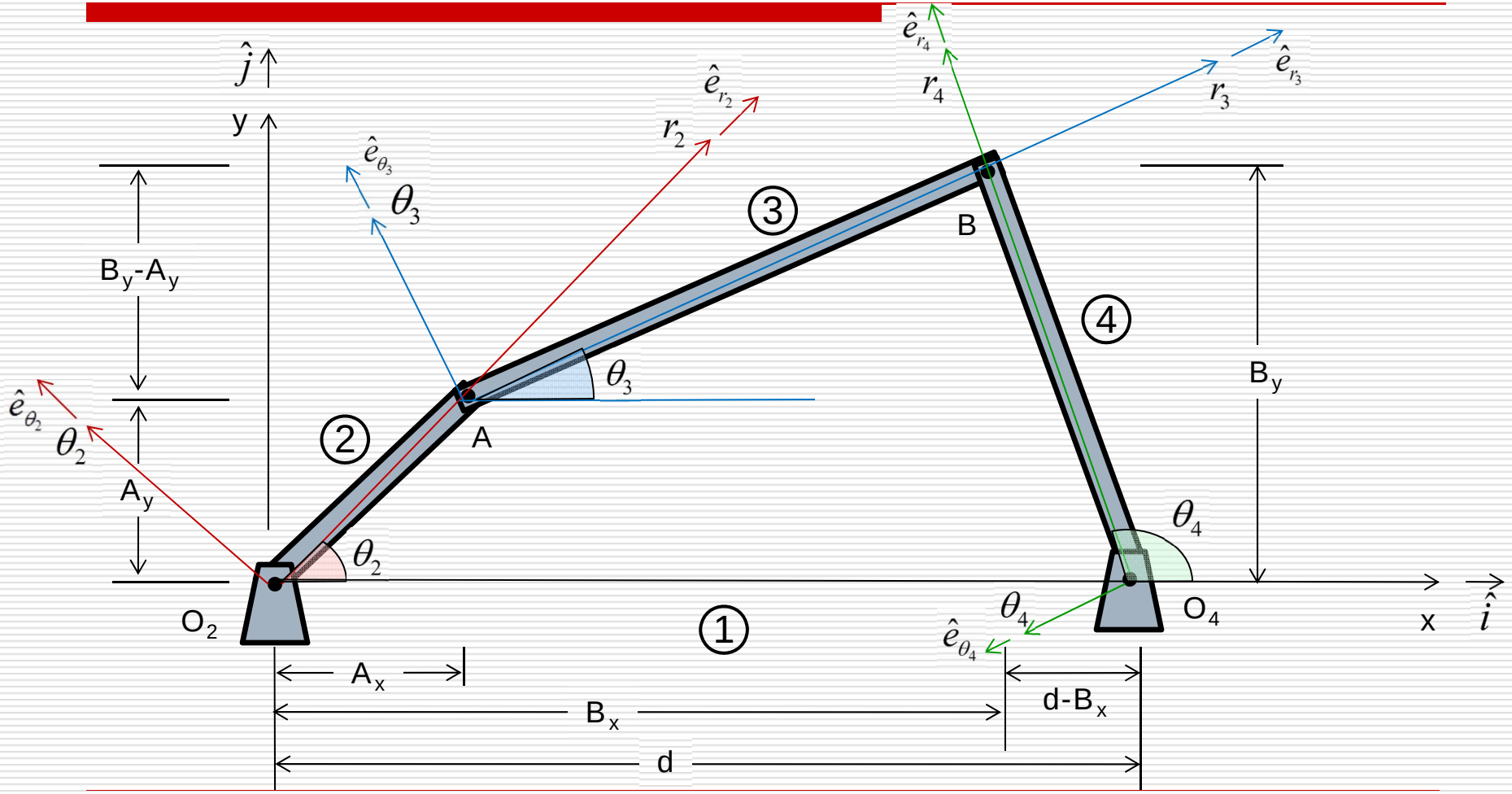


RBB

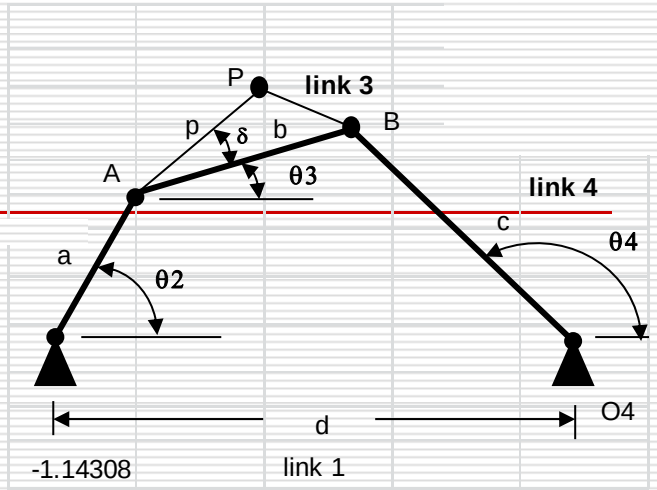
TYPE I (RRRR): 4-BAR COUPLER MOTION ANAMATION



TYPE I (RRRR): 4 - BAR



4-Bar Algorithm



4-Bar Linkage		
a=	5	Link 2
b=	12	Link 3
c=	10	Link 4
d=	15	Link 1
$\theta_2 =$	60	1.047197551

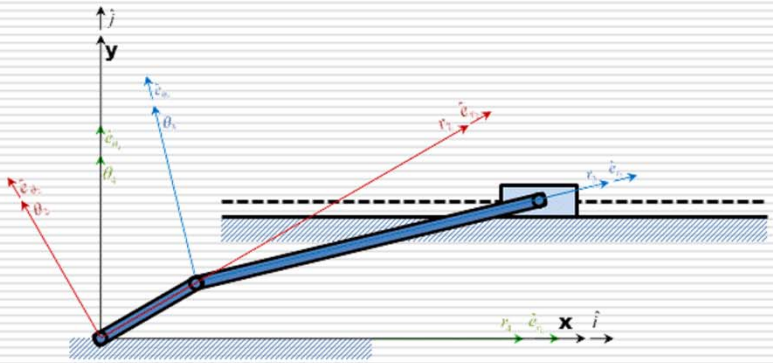
p=	5
δ=	331

By=	9.83	-6.59
Bx=	13.17	7.48
$\theta_3 =$	27.3	-65.5
$\theta_4 =$	100.6	-138.8

K1=	9.7600E+00
K2=	3.4641E-01
K3=	3.2414E+00
K4=	-6.4770E+01

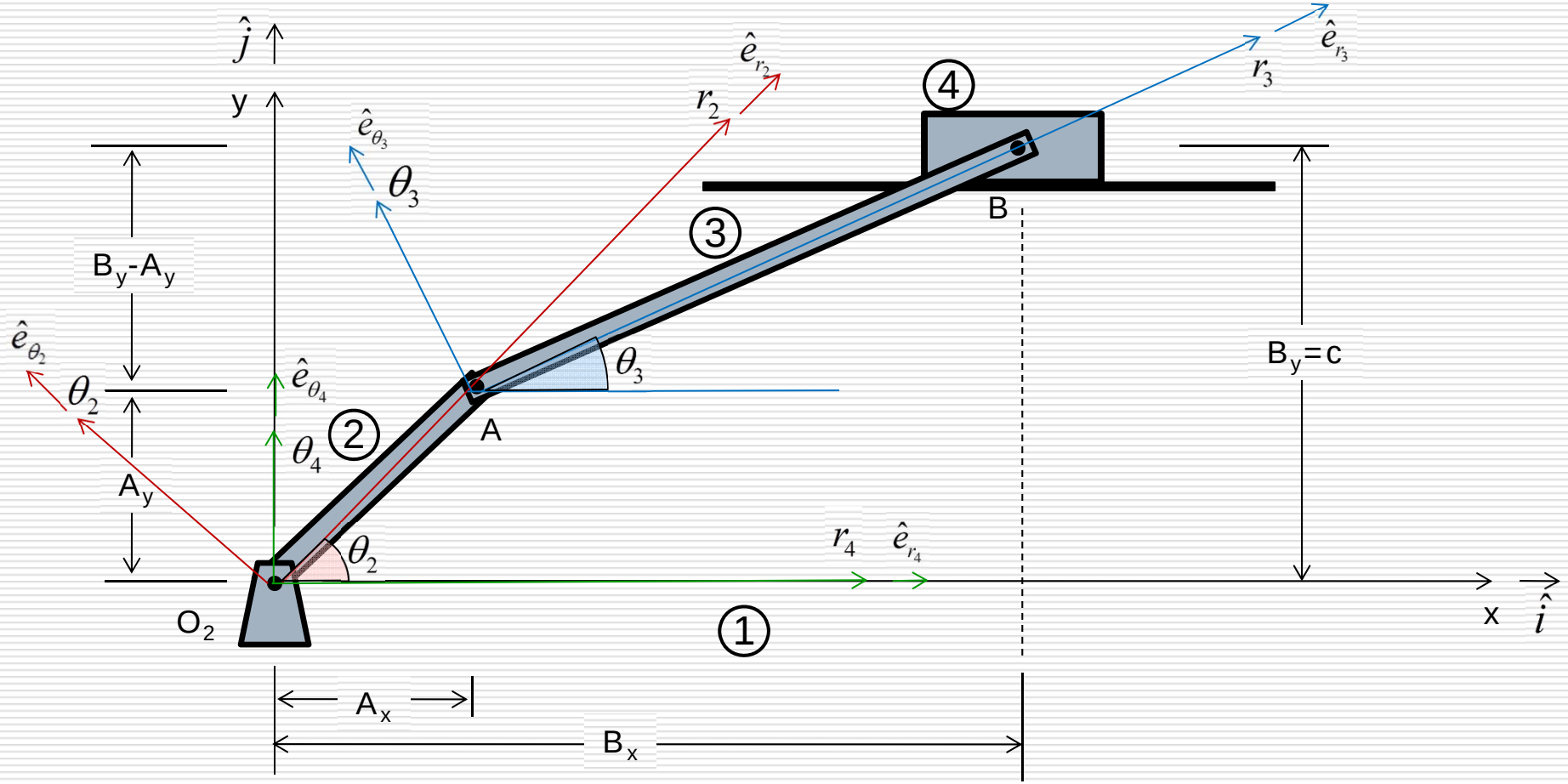
					e_r		e_θ	
	x comp	y comp	mag	angle	i	j	i	j
r04=	**15.00**	**0.00**	**15.000**	**0.0**	**1.000**	**0.000**	**0.000**	**1.000**
rA=	**2.50**	**4.33**	**5.000**	**60.0**	**0.500**	**0.866**	**-0.866**	**0.500**
rBA=	10.67	5.50	12.000	27.3	0.889	0.458	-0.458	0.889
rBO4=	-1.83	9.83	10.000	100.6	-0.183	0.983	-0.983	-0.183
rB=	**13.17**	**9.83**	**16.430**	**36.7**	**0.801**	**0.598**	**-0.598**	**0.801**
rPA=	5.00	-0.15	5.000	-1.7	1.000	-0.030	0.030	1.000
rP=	**7.50**	**4.18**	**8.584**	**29.1**	**0.873**	**0.487**	**-0.487**	**0.873**
ALT	**x comp**	**y comp**	**mag**	**angle**	**i**	**j**	i	j
rO4=	**15.00**	**0.00**	**15.000**	**0.0**	**1.000**	**0.000**	**0.000**	**1.000**
rA=	**2.50**	**4.33**	**5.000**	**60.0**	**0.500**	**0.866**	**-0.866**	**0.500**
rBA=	4.98	-10.92	12.000	-65.5	0.415	-0.910	0.910	0.415
rBO4=	-7.52	-6.59	10.000	-138.8	-0.752	-0.659	0.659	-0.752
rB=	**7.48**	**-6.59**	**9.966**	**-41.4**	**0.750**	**-0.661**	**0.661**	**0.750**
rPA=	-0.39	-4.98	5.000	-94.5	-0.078	-0.997	0.997	-0.078
rP=	**2.11**	**-0.65**	**2.208**	**-17.2**	**0.955**	**-0.296**	**0.296**	**0.955**

TYPE II: (RRRP)
Slider Crank



RBB

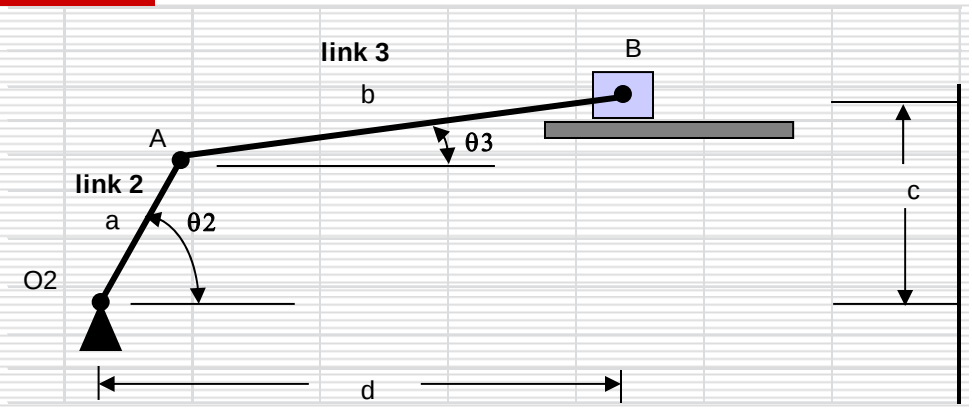
TYPE II: (RRRP): SLIDER CRANK



Slider Crank Algorithm

a=	**5.5**	Link 2
b=	**21**	Link 3
c=	**2**	Offset
$\theta_2 =$	**55**	0.959931089

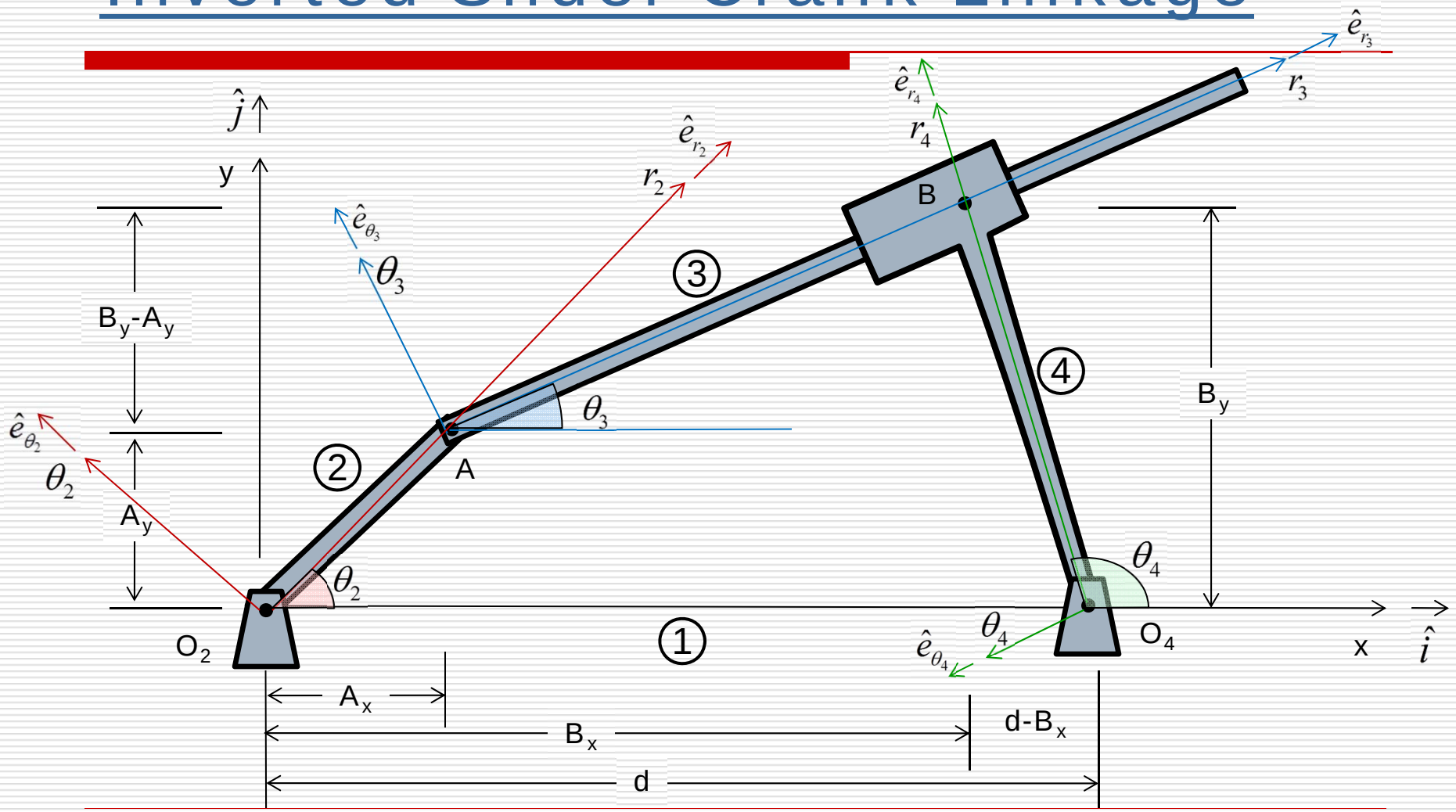
By=	**2.00**	**2.00**
Bx=	**24.00**	**-17.70**
$\theta_3 =$	**-6.9**	**-173.1**



					e_r		e_θ	
	x comp	**y comp**	**mag**	**angle**	**i**	**j**	**i**	**j**
rB=	**24.00**	**2.00**	**24.09**	**4.8**	**0.997**	**0.083**	-0.083	0.997
rA=	**3.15**	**4.51**	**5.50**	**55.0**	**0.574**	**0.819**	-0.819	0.574
rBA=	20.85	-2.51	21.00	-6.9	0.993	-0.119	0.119	0.993

alt	**x comp**	**y comp**	**mag**	**angle**	**i**	**j**	**i**	**j**
rB=	**-17.70**	**2.00**	**17.81**	**173.6**	**-0.994**	**0.112**	-0.112	-0.994
rA=	**3.15**	**4.51**	**5.50**	**55.0**	**0.574**	**0.819**	-0.819	0.574
rBA=	-20.85	-2.51	21.00	-173.1	-0.993	-0.119	0.119	-0.993

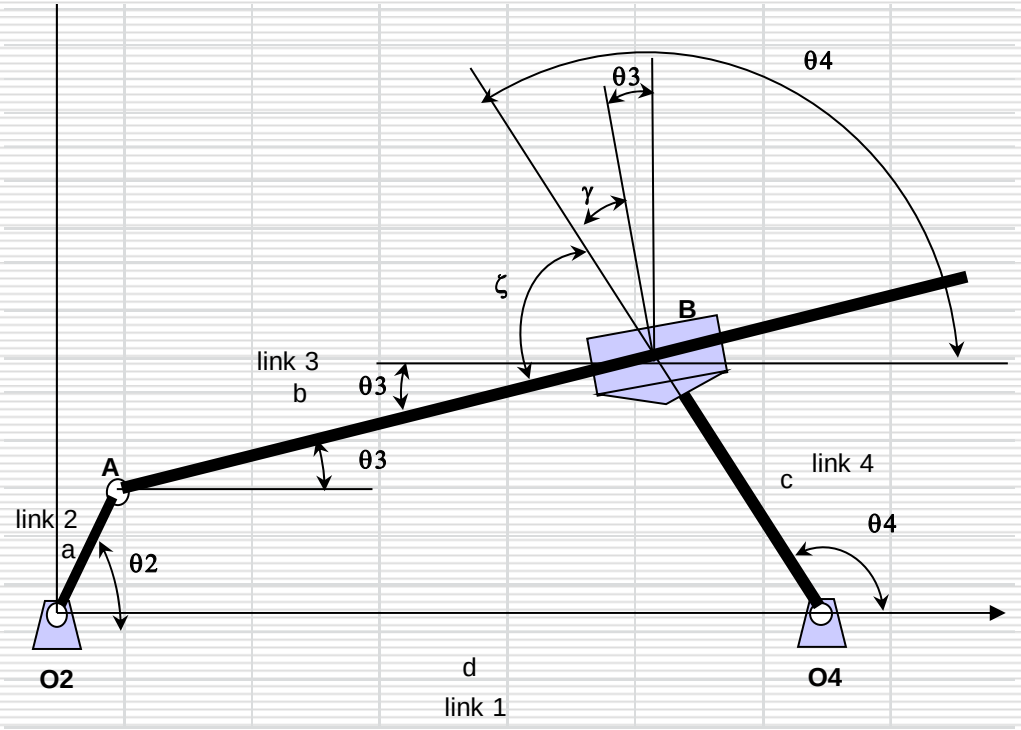
TYPE II: (RRRP)
Inverted Slider Crank Linkage



Slider Crank Algorithm
Inputs and Geometric Calculations

a=	**10**	Link 2
c=	**6**	Link 4
d=	**3**	Link 1
$\theta_2 =$	**45**	
γ=	**45**	

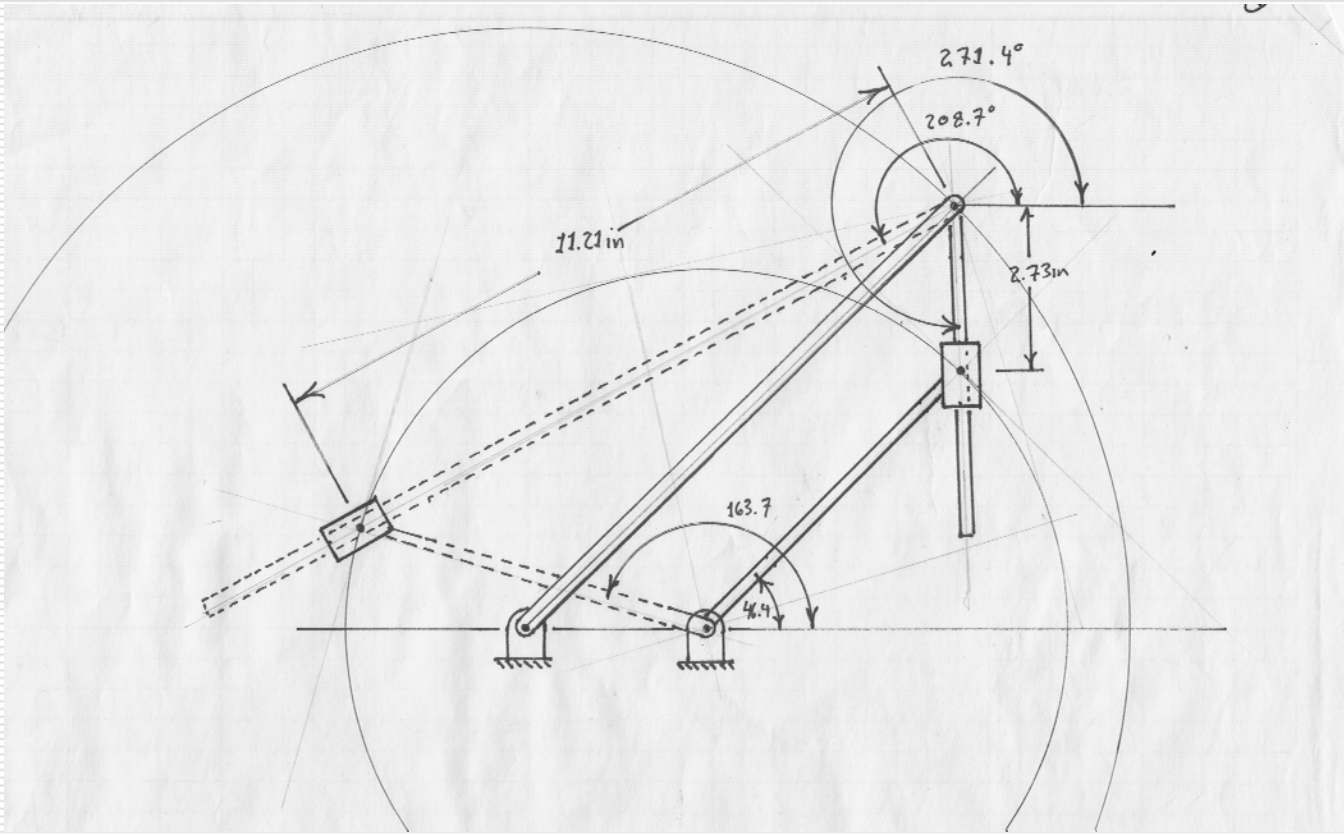
b́=	**2.73**	**-11.21**
$\theta_4 =$	**46.40**	**163.74**
$\theta_3 =$	**-88.60**	**28.74**



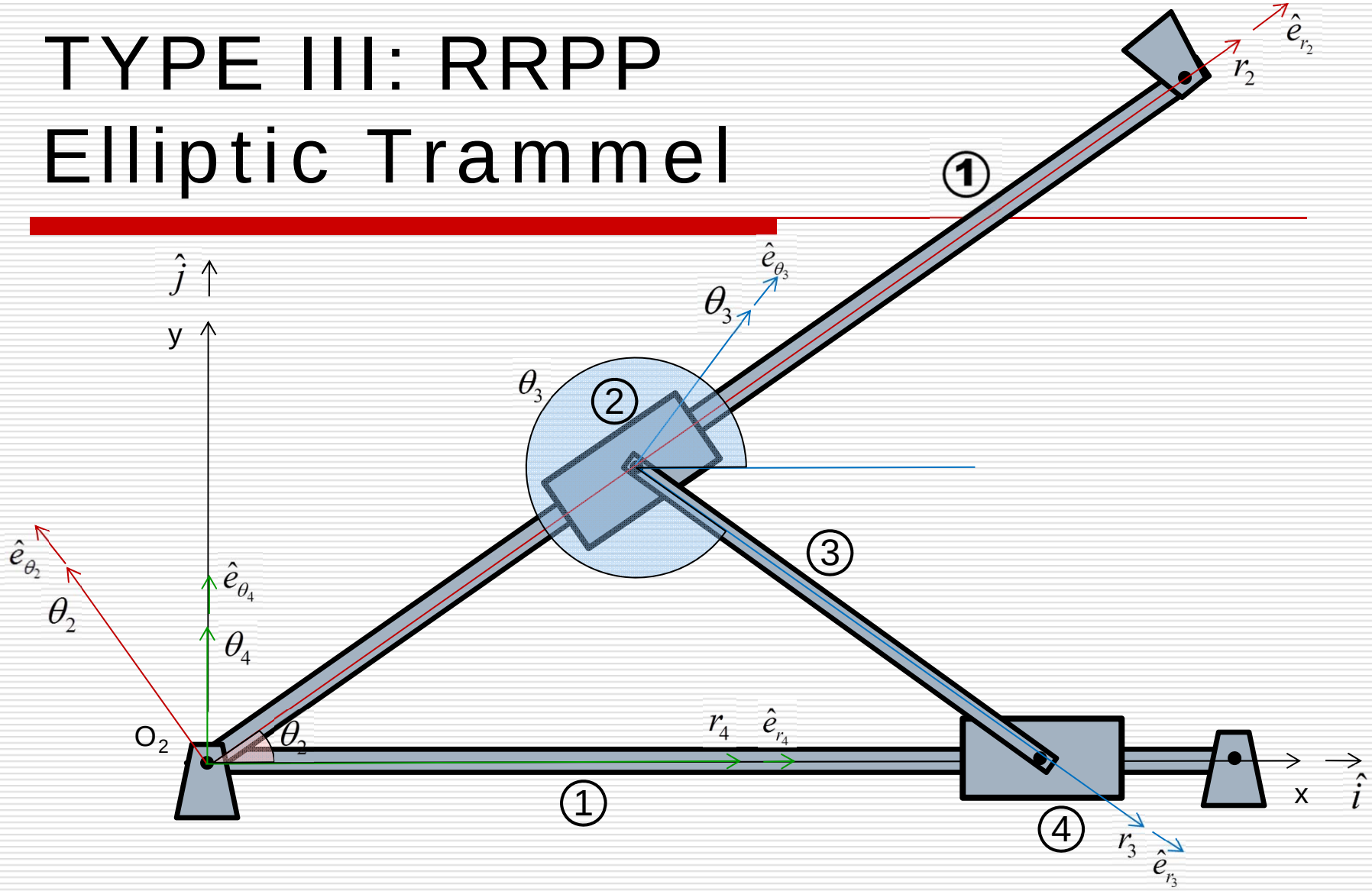
Slider Crank Algorithm
Position Vector Analysis

					e_r		e_θ	
	x comp	**y comp**	**mag**	**angle**	**i**	**j**	**i**	**j**
rO4=	**3.00**	**0.00**	**3.00**	**0.0**	**1.000**	**0.000**	0.000	1.000
rA=	**7.07**	**7.07**	**10.00**	**45.0**	**0.707**	**0.707**	-0.707	0.707
rBA=	0.07	-2.73	2.73	-88.6	0.024	-1.000	1.000	0.024
rBO4=	4.14	4.35	6.00	46.4	0.690	0.724	-0.724	0.690
rB=	**7.14**	**4.35**	**8.36**	**31.3**	**0.854**	**0.520**	-0.520	0.854
alt	**x comp**	**y comp**	**mag**	**angle**	**i**	**j**	**i**	**j**
rO4=	**3.00**	**0.00**	**3.00**	**0.0**	**1.000**	**0.000**	0.000	1.000
rA=	**7.07**	**7.07**	**10.00**	**45.0**	**0.707**	**0.707**	-0.707	0.707
rBA=	-9.83	-5.39	11.21	-151.3	-0.877	-0.481	0.481	-0.877
rB04=	-5.76	1.68	6.00	163.7	-0.960	0.280	-0.280	-0.960
rB=	**-2.76**	**1.68**	3.23	148.7	-0.854	0.520	-0.520	-0.854

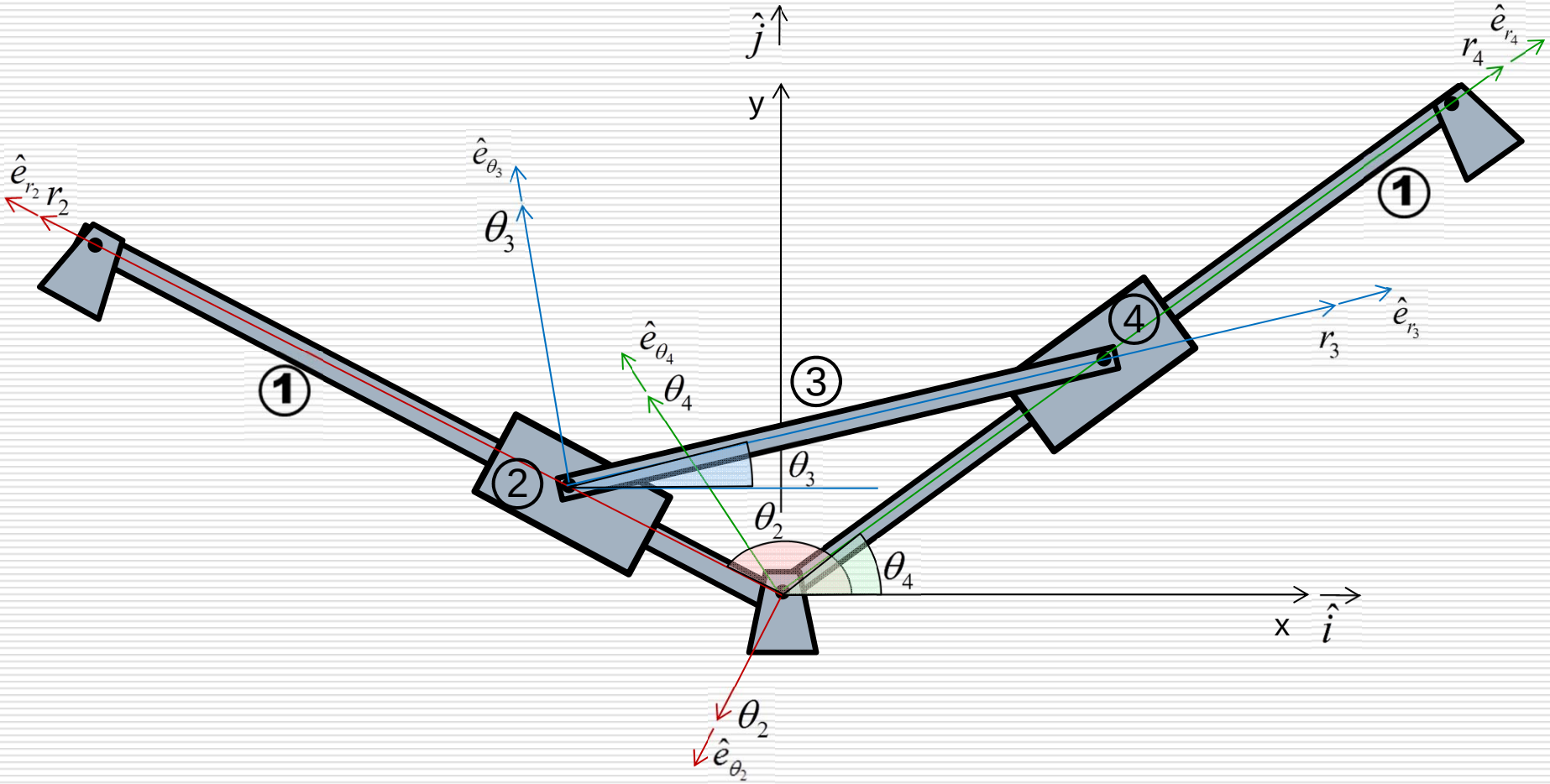
Slider Crank Algorithm
Drawing of the Configuration



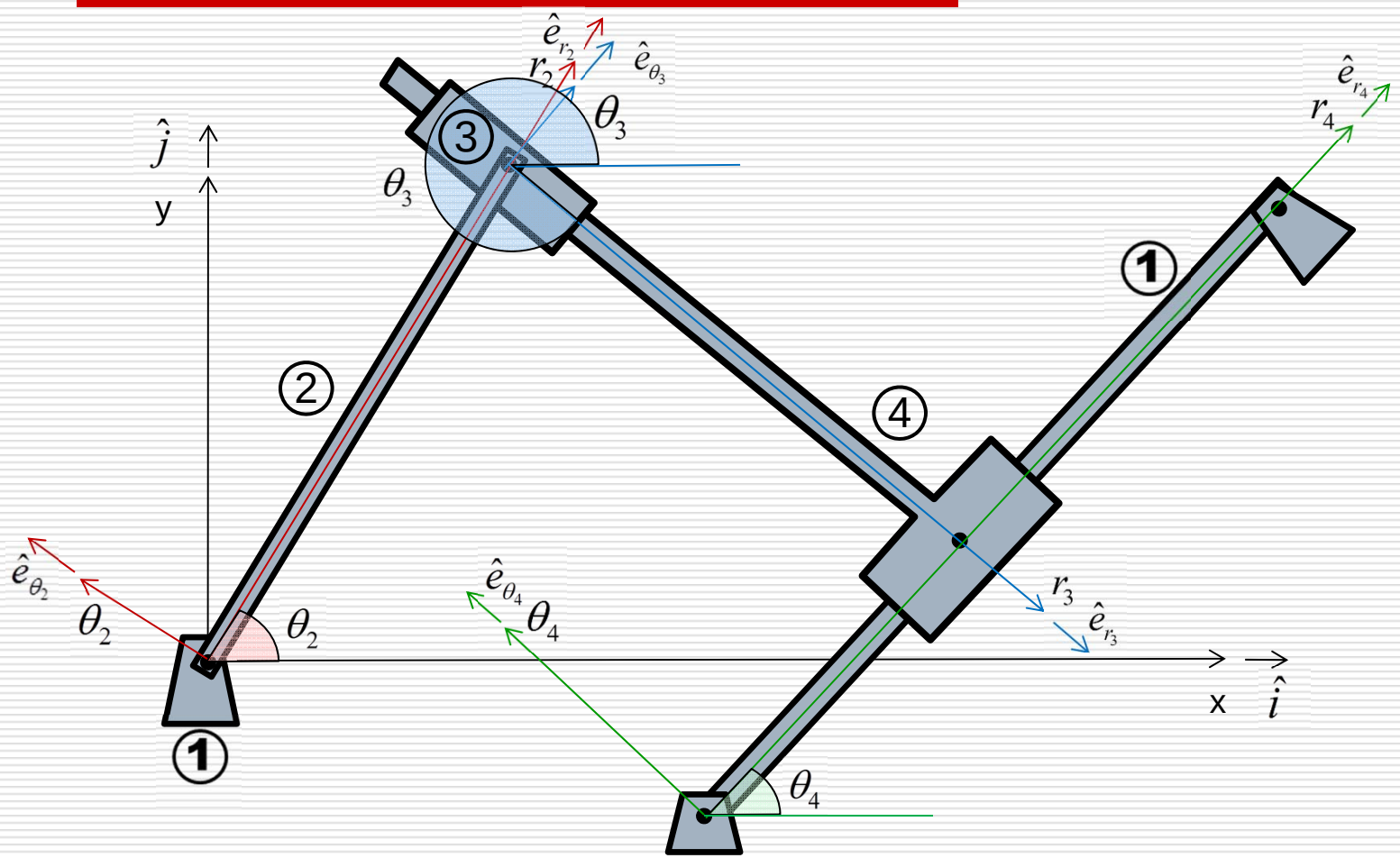
TYPE III: RRPP
Elliptic Trammel



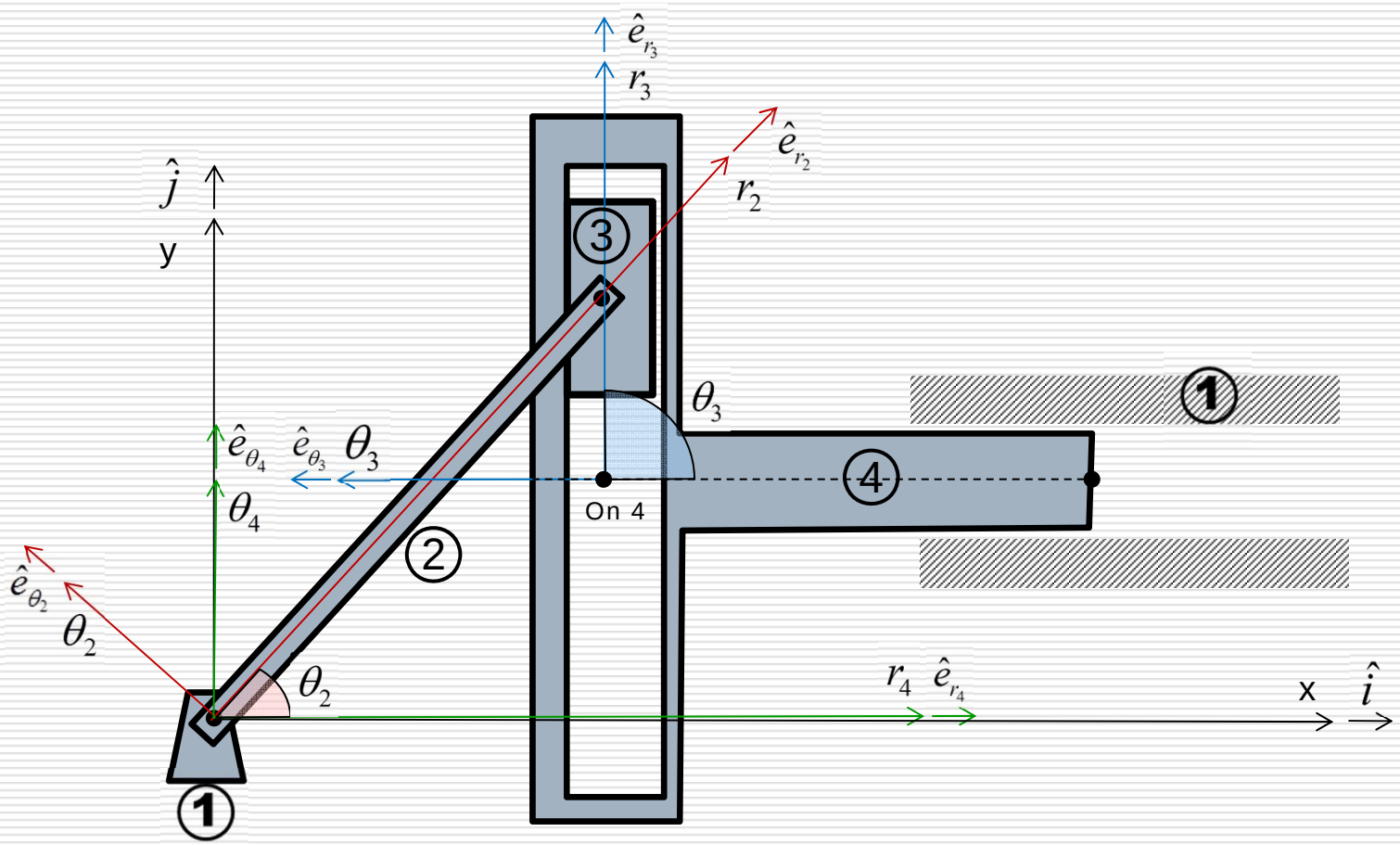
Type III: RRPP
Elliptic Trammel



Type III: RRPP
Elliptic Trammel



Type III: RRPP
Elliptic Trammel: Scotch Yoke



Type IV: RPRP
Rapson Slide Linkage