

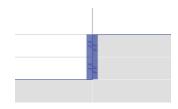
Rigid link

10/6/2022

When Linear Rigid Link should be applied

1-In my opinion I prefer to plot the column in its location as drawings exactly, moving column C.G. At beam intersection not simulate actually the behavior of the column and beam, so we can use rigid link to transfer loads from beam to column C.G

2-column which connect at two beams not at same line



The question what actually simulate the beam column connection for the second case

1-Rigid Link fixed displacement and rotations

General Link Property Name	Link-displacement+ro	atatione	P-Delta Parameters	Modify/Show	
Link Type	Linear	100013	Acceptance Criteria		
		~	Acceptance Cilteria	Modify/Show	N
Link Property Notes	Modify/Show N	Notes			
Fotal Mass and Weight					
Mass	0 k	kg	Rotational Inertia 1	0	ton-m ²
Weight	0 k	«N	Rotational Inertia 2	0	ton-m ²
			Rotational Inertia 3	0	ton-m ²
actors for Line and Area	Springs				
Link/Support Property	s Defined for This Length	When Used in a Lin	e Spring Property	0.3048	m
	s Defined for This Length s Defined for This Area Wi			0.3048	m m ²
Link/Support Property	-				
Link/Support Property	-				
	-	hen Used in an Are			
Link/Support Property	s Defined for This Area Wi	hen Used in an Area	a Spring Property		
Link/Support Property Directional Properties Direction Fixed	s Defined for This Area Wi Properti	hen Used in an Area	a Spring Property Direction Fixed		
Link/Support Property I Directional Properties Direction Fixed	s Defined for This Area Wi Properti	hen Used in an Area	Direction Fixed		
Link/Support Property Directional Properties Direction Fixed U1 2 U1 2	s Defined for This Area Wi Properti	hen Used in an Area	a Spring Property Direction Fixed R1 R1 R2 P		
Link/Support Property Directional Properties Direction Fixed U1 2 U1 2	s Defined for This Area Wi Properti	hen Used in an Area	a Spring Property Direction Fixed R1 R1 R2 P		
Link/Support Property Directional Properties Direction Fixed U1 2 U1 2	s Defined for This Area Wi Properti	hen Used in an Are	Direction Fixed R1 2 R2 2 R3 2		
Link/Support Property Directional Properties Direction Fixed UII 2 U2 2 U3 2 Rtfiness Options	s Defined for This Area Wi Properti	hen Used in an Are	Direction Fixed R1 2 R2 2 R3 2		
Link/Support Property Directional Properties Direction Fixed UII UI UI UI UI E UI E UI E UI E E E E E E E E E E E E E	s Defined for This Area Wi Propert Modfy/Show	hen Used in an Arei ies r for Al Fix Al	Direction Fixed R1 2 R2 2 R3 2		

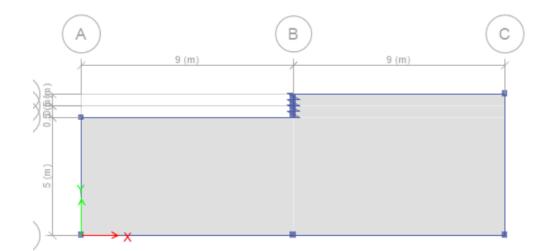


2-Rigid Link fixed displacement only

eneral					
Link Property Name	Link-displa	acement	P-Delta Parameters	Modify/Show	w
Link Type	Linear	~	Acceptance Criteria	Modify/Show	w
Link Property Notes	Modify/Show Notes		No	lone specified	
otal Mass and Weight					
Mass	0	kg	Rotational Inertia 1	0	ton-m ²
Weight	0	kN	Rotational Inertia 2	0	ton-m ²
			Rotational Inertia 3	0	ton-m ²
actors for Line and Area S	Springs				
Link/Support Property is	s Defined for Th	iis Length When Used in a	Line Spring Property	0.3048	m
Link/Support Property is	s Defined for Th	iis Area When Used in an /	Area Spring Property	0.09	m²
	s Defined for Th	iis Area When Used in an A	Area Spring Property	0.09	m²
	s Defined for Th	iis Area When Used in an A Properties	Area Spring Property Direction Fixed	0.09	m²
irectional Properties				0.09	m²
irectional Properties Direction Fixed		Properties	Direction Fixed	0.09	m²
irectional Properties Direction Fixed UI UI		Properties	Direction Fixed	0.09	m²
irectional Properties Direction Fixed U1 C U2 C		Properties odfy/Show for All	Direction Fixed R1 R2 R3 R3	0.09	m²
irrectional Properties Direction Fixed U1 C U2 C		Properties	Direction Rxed	0.09	m²
irectional Properties Direction Fixed U1 U1 U2 U2 U3 U3		Properties odfy/Show for All	Direction Fixed R1 R2 R3 R3	0.09	m²
irrectional Properties Direction Fixed U1 C U2 C	Mc	Properties udfy/Show for All Fix All	Direction Fixed R1 R2 R3 R3	0.09	m²
irrectional Properties Direction Fixed UI C U2 C U2 C U3 C	Mc	Properties ddfy/Show for All Fix All ad Cases	Direction Fixed R1 R2 R3 R3	0.09	m²
Interctional Properties Direction Fixed U1 U1 U2 U2 U2 U3 U3 U3 Uffness Options Stiffness Used for Linea Stiffness Used for Stiffn	ar and Modal Lo	Properties ddfy/Show for All Fix All ad Cases	Direction Fixed R1 R2 R3 Clear Al	0.09	m²

To check the difference can be discovered though the following Example

<u>Example</u>

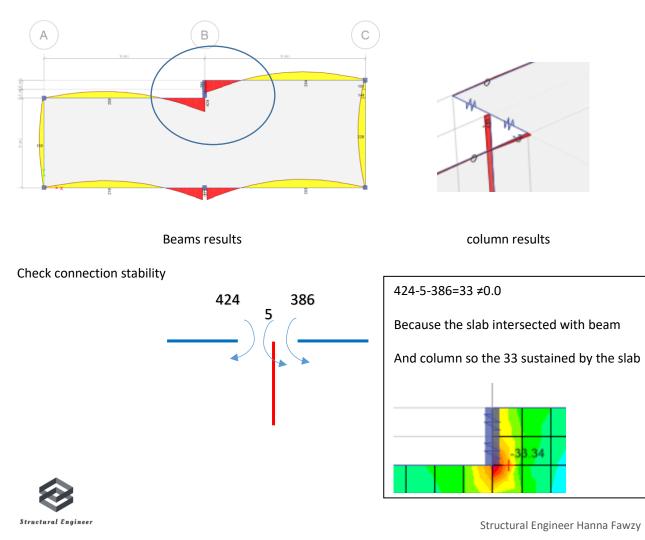




Assume beams connect the long column with rigid links as following properties

General				
Link Property Name	Link-displacement+rotations	P-Delta Parameters	Modify/Sho	w
Link Type	Linear V	Acceptance Criteria	Modify/Sho	w
Link Property Notes	Modify/Show Notes		one specified	
Total Mass and Weight				
Mass	0 kg	Rotational Inertia 1	0	ton-m
Weight	0 kN	Rotational Inertia 2	0	ton-m
		Rotational Inertia 3	0	ton-m
Link/Support Property is	s Defined for This Length When Used in a Defined for This Area When Used in a Properties		0.3048	m m²
Link/Support Property is	s Defined for This Area When Used in a	an Area Spring Property		
Link/Support Property is	s Defined for This Area When Used in a	an Area Spring Property		
Link/Support Property is Directional Properties Direction Fixed	Defined for This Area When Used in a Properties	an Area Spring Property Direction Fixed		
Unk/Support Property in Directional Properties Direction Fixed	Defined for This Area When Used in a Properties	Direction Fixed		
Link/Support Property is Directional Properties Direction Fixed U1 2 U1 2	Defined for This Area When Used in a Properties	Direction Fixed		
Link/Support Property is Directional Properties Direction Fixed UI 2 U2 2 U2 2 U3 2	Defined for This Area When Used in a Properties Modify/Show for All.	Direction Rived R1 2 R2 8 R3 8		
Link/Support Property is Directional Properties Direction Fixed U 2 U 2 U 2 Stiffness Options	Defined for This Area When Used in a Properties Modify/Show for All.	Direction Rived R1 2 R2 8 R3 8		
Link/Support Property is Directional Properties Unection Read U U U U U U U U U U U U U U U U U U U	Defined for This Area When Used in A Properties Modify/Show for Al Fix Al	Direction Rived R1 2 R2 8 R3 8		

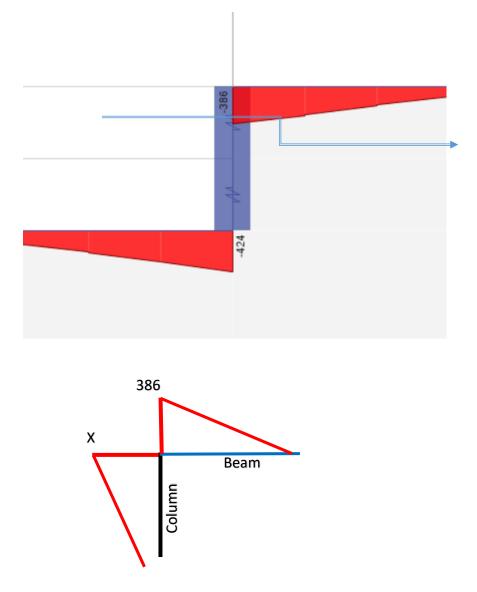
The results of BM for beams as following



So the results show that the beam act as same as continues beam has the same axis and column act as interior column sustain very small moment value .

But is this actually simulate the actual interaction stresses

If we have section on column very close to beam than column centrode



At section location to make beam – column connection stable X must equal 386 and column section and reinforcement must be strong enough to transfer the BM to column C.G.

So <mark>I think consider the linear Rigid Link fixed rotation not good for this case and recognized the local stresses occurred at the column edge</mark>



E Link Property Data × General Link Property Name Link-displacement P-Delta Parameters Modify/Show Link Type Linear Acceptance Criteria Modify/Show. None specified Link Property Notes Modify/Show Notes.. Total Mass and Weight Mass kg Rotational Inertia 1 0 ton-m² Weight 0 kN Rotational Inertia 2 0 ton-m² Rotational Inertia 3 ton-m² Factors for Line and Area Springs Link/Support Property is Defined for This Length When Used in a Line Spring Property 0.3048 m Link/Support Property is Defined for This Area When Used in an Area Spring Property 0.09 m² Directional Properties Direction Fixed Properties Direction Fixed 🗹 U1 🛛 🗹 Modify/Show for All. 🗌 R1 🛛 🗹 U2 🔽 🗌 R2 🗹 U3 🛛 🗹 🗆 R3 🗌 Clear All Fix All Stiffness Options Stiffness Used for Linear and Modal Load Cases Stiffness Used for Stiffness-proportional Viscous Damping Stiffness-proportional Viscous Damping Coefficient Modification Factor OK Cancel

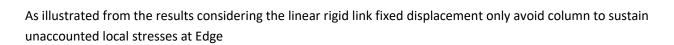
Assume beams connect the long column with rigid links as following properties

The results of BM for beams as following

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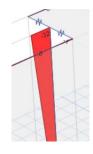
В



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1



Conclusion

All above is my thoughts for modelling the rigid link and checking the different results, I open minded for any different or opposite opinions.

Thank you for your Time

