



Structural Engineer

10/6/2022

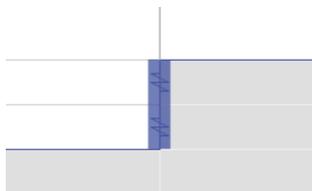
Rigid link

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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

Link Property Data

General

Link Property Name: Link-displacement+rotations
 Link Type: Linear
 Link Property Notes: [Modify/Show Notes...](#)

P-Delta Parameters: [Modify/Show...](#)
 Acceptance Criteria: [Modify/Show...](#)
 None specified

Total Mass and Weight

Mass: 0 kg
 Weight: 0 kN
 Rotational Inertia 1: 0 ton-m²
 Rotational Inertia 2: 0 ton-m²
 Rotational Inertia 3: 0 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
<input checked="" type="checkbox"/> U1	<input checked="" type="checkbox"/>	Modify/Show for All...	<input checked="" type="checkbox"/> R1	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> U2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> R2	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> U3	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> R3	<input checked="" type="checkbox"/>

[Fix All](#) [Clear 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: 1

[OK](#) [Cancel](#)



2-Rigid Link fixed displacement only

Link Property Data

General

Link Property Name: Link-displacement
 Link Type: Linear
 Link Property Notes: Modify/Show Notes...
 P-Delta Parameters: Modify/Show...
 Acceptance Criteria: Modify/Show...
 None specified

Total Mass and Weight

Mass: 0 kg
 Weight: 0 kN
 Rotational Inertia 1: 0 ton-m²
 Rotational Inertia 2: 0 ton-m²
 Rotational Inertia 3: 0 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
<input checked="" type="checkbox"/> U1	<input checked="" type="checkbox"/>	Modify/Show for All...	<input type="checkbox"/> R1	<input type="checkbox"/>
<input checked="" type="checkbox"/> U2	<input checked="" type="checkbox"/>		<input type="checkbox"/> R2	<input type="checkbox"/>
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Fix All Clear All

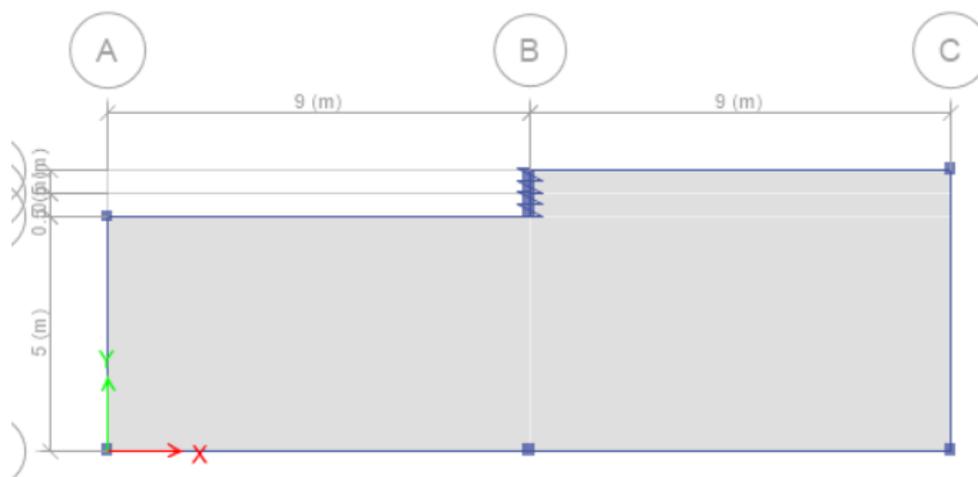
Stiffness Options

Stiffness Used for Linear and Modal Load Cases:
 Stiffness Used for Stiffness-proportional Viscous Damping:
 Stiffness-proportional Viscous Damping Coefficient Modification Factor: 1

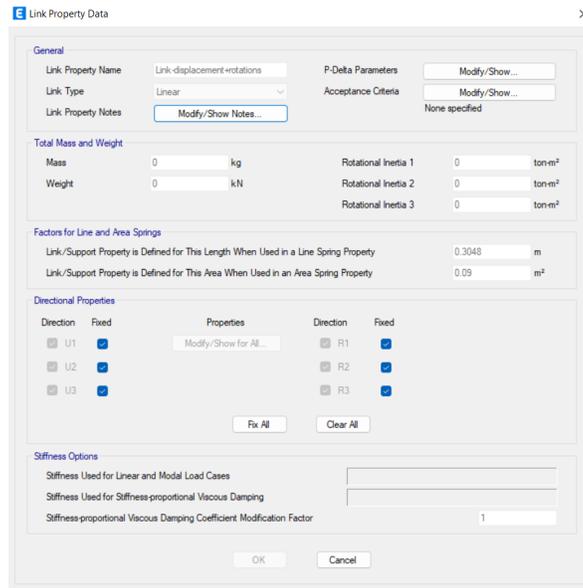
OK Cancel

To check the difference can be discovered through the following Example

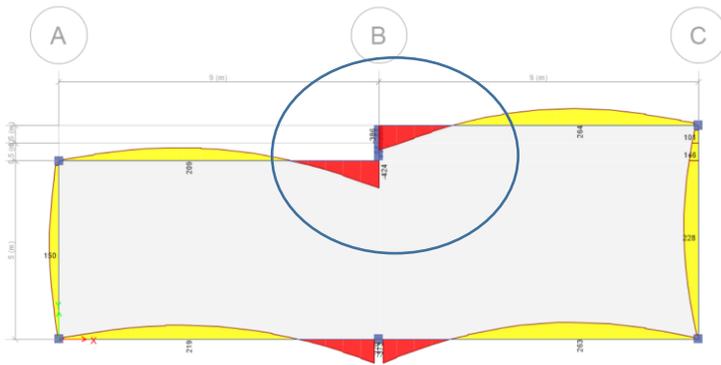
Example



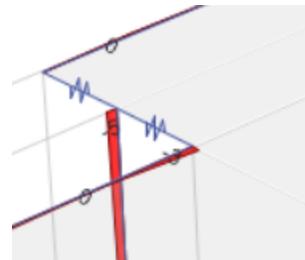
Assume beams connect the long column with rigid links as following properties



The results of BM for beams as following

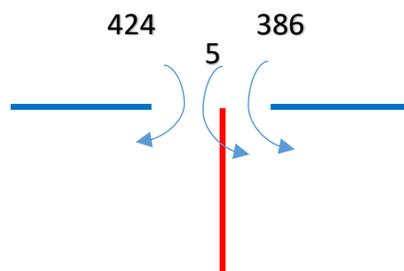


Beams results



column results

Check connection stability

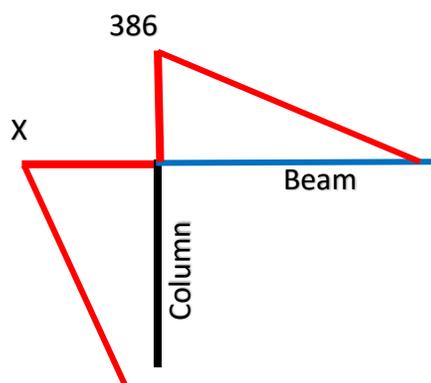
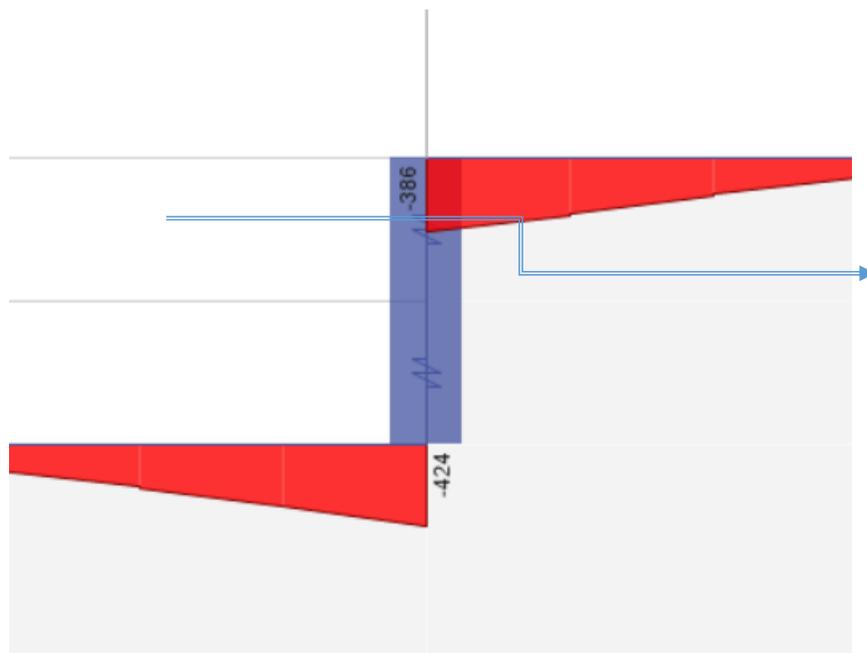


$424 - 5 - 386 = 33 \neq 0.0$
 Because the slab intersected with beam
 And column so the 33 sustained by the slab

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 centre

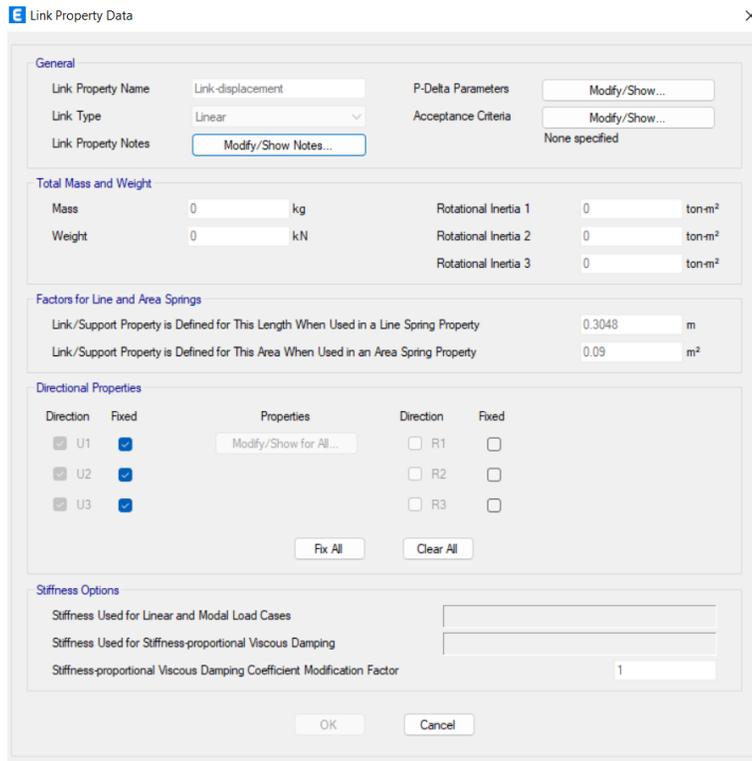


At section location to make beam – column connection stable X must equal 386 and column section and reinforcement must be strong enough to transfer the BM to column C.G.

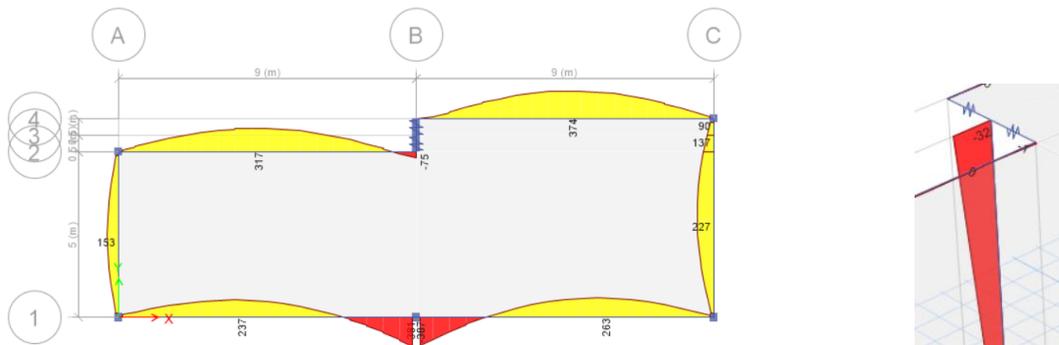
So I think consider the linear Rigid Link fixed rotation not good for this case and recognized the local stresses occurred at the column edge



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



The results of BM for beams as following



As illustrated from the results considering the linear rigid link fixed displacement only avoid column to sustain unaccounted local stresses at Edge

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

