Ductility Design of Earthquake Resistant High-Rise RC Building

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Summary

In the Large city that high-rise building are concentrated in China , the seismic intensety is height , the wind load is larger , the engneering geology is led , and building plan and elevation size and form is complex , high -width ratio larger , structural period long , some building is more towery , these privet more new and more high demand for resistance earthquake design .Regulated in national standard 《 The Resistance Earthquake Design Code of Building 》 in China , standard for Resistance earthquake hagard protection is "not damaged in minor seismic , repairable in mdium seismic and no collapes in major seismic". How to ensure these demand ? code main adopt approximated and Practical method that regulated internal force of memler section.Based on summing-up the research results of resistance earthquake ductility design of high-rise RC building sturcture , this paper discusses ductility demand of resistance earthguake of high-rise RC building structure and regulated principle and method of interal force of memher section .

1.Ductility demand for resistance earthquake of high-rise RC building sturcture

Resistance earthquake design of high-rise RC building sturcture should ensure whole property resistance earthquake of sturcture,take in learing capaity ,rigity and ductility of sturcture each other coordinate, so that the focal point of resistance earthquake design of high-rise RC building sturcture is ductility design. Ductility demand of resistance earthquake of high-rise RC building structure is :

- •Strong column and soft beam of RC frame
- •Shear-pressure ratio in column of RC frame
- •Moment regulate in beam end of RC frame
- •Shear-pressure ratio in point of RC frame
- •Shear-pressure ratio in beam of RC frame
- •Axial pressure ratio in column of RC frame
- •Stromg shear and soft curve in column of RC frame
- •Strong connect and soft member of RC frame point
- •Rigity discount of connecting beam of shear wall
- •Shear-pressure ratio of shear wall
- •Axial-pressure ratio of shear wall
- •Shear pressure ratio of connecting beam of shear wall

- Strong shear and soft curve of connecting beam of shear wall
- Strong shear and soft curve of under strong area of shear wall
- Axial force incyease for frame suported column
- Moment increase for column base in base story of coumm

2. Prin ciple and method of regulation interal force of memler section

For example strong column and soft beam of RC frame sturcture should be had follow requirement:

$$\Sigma M_{cua} \geq \eta_R \Sigma M_{bua} \quad (1)$$

Code comprehensive considered resistance earthquake safety,economic and design work possibility of sturcture ,based on theory ,test study and engneering design and economic etc condition ,considered learing capacity resistance earthquake uegulate coefficient ,difference not alike resistance earthquake degree of RC sturcture ,adopt comprehensive method,for class 3 or class 4 of sturcture, not regulated interal force of memler section,only adopt sturctural measure to ensure ductilityof structure,for class 1 or class 2 of sturcture,adopt in rugulated interal force of member section ,code used method :

$$\Sigma Mc = 1.1 \Sigma M_{bua} \quad (2)$$

$$\Sigma Mc = 1.1 \lambda j \Sigma M_b \quad (3)$$

$$\Sigma Mc = \eta_M \Sigma M_b \quad (4)$$

In equation,λj — Practial setting coefficient for class 2 of RC frame $\lambda j=1.0$,for class 1 of RC frame ,may be adopt 1.1 time of ratio of practical tension reinforcement total area and area of calculating reinforcement Increace coefficient of moment of column end $\eta_M=1.1\lambda j$ or adopt 1.35 ~ 1.5 interal with huilding hight.

For example resistance earthquake class 1 of RC framce,λj calculate following:

$$\lambda j1 = 1.1 \frac{1964 + 1520}{1632.2 + 1411.7} = 1.26(clockwise)$$

$$\lambda j2 = 1.1 \frac{1964 + 1520}{1691.9 + 891.4} = 1.48(clockcounter)$$

Point of RC frame and section of beam and column see Fig.1.

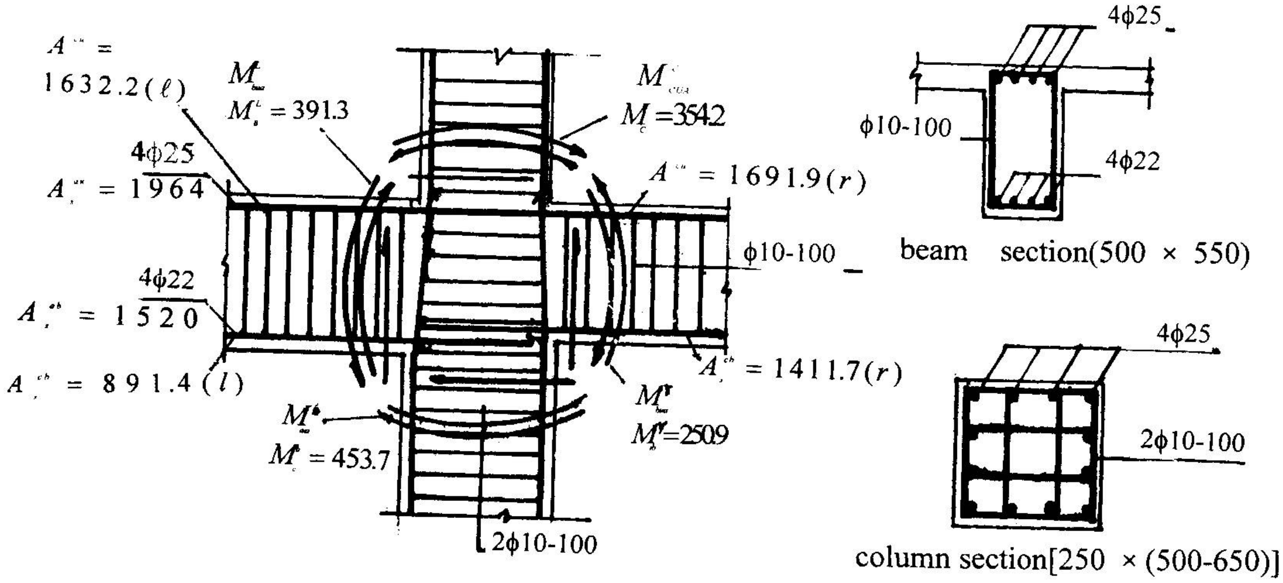

Fig1. Point of RC frame