



**UNIVERSIDAD CATOLICA DE  
SANTIAGO DE GUAYAQUIL**

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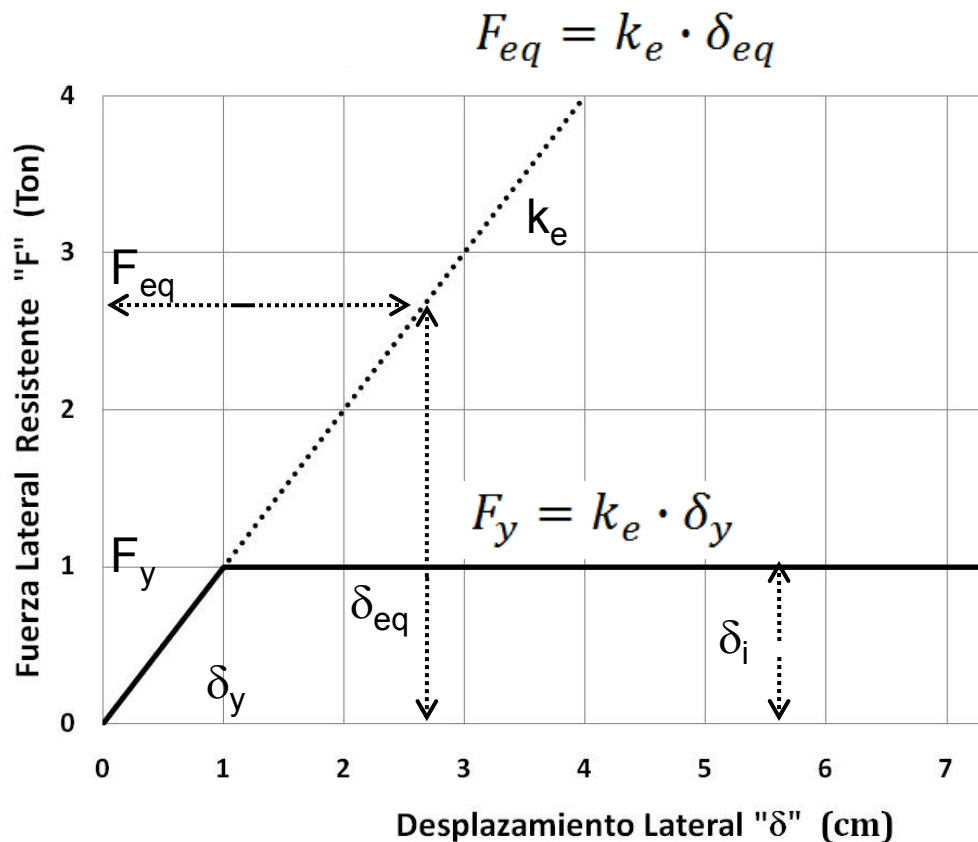
## **CAPITULO 4 - DINAMICA ESTRUCTURAL**

### 4.8 Comportamiento Inelastico de Sistemas 1GDL



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## Curva de Capacidad Estructuras 1GDL No-redundantes y sin Efecto P-Δ



$$W_{iac} = \frac{F_y \cdot \delta_y}{2} = \frac{k_e \cdot \delta_y^2}{2}$$

$$W_{idc} = F_y \cdot (\delta_i - \delta_y)$$

$$W_{iti} = \frac{k_e \cdot \delta_y^2}{2} + k_e \cdot \delta_y \cdot (\delta_i - \delta_y)$$

$$W_{iti} = k_e \cdot \delta_y \cdot \delta_i - \frac{k_e \cdot \delta_y^2}{2}$$

$$W_{eq} = \frac{k_e \cdot \delta_{eq}^2}{2}$$

$$W_{iti} = W_{eq}$$

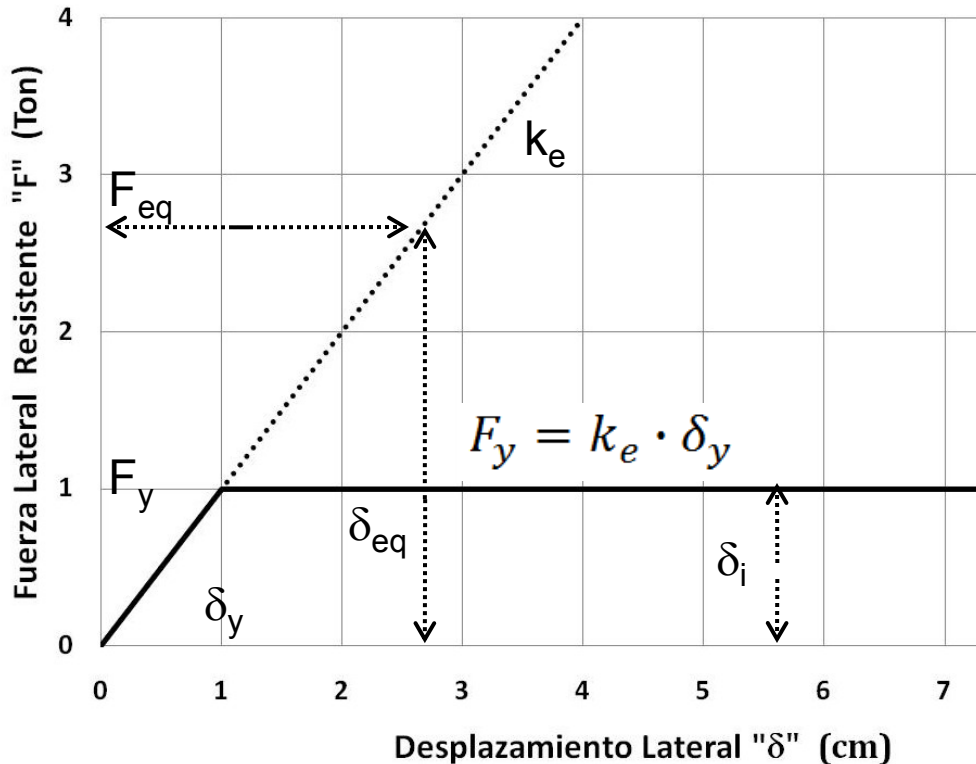


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## Curva de Capacidad Estructuras 1GDL No-redundantes y sin Efecto P-Δ

$$F_{eq} = k_e \cdot \delta_{eq}$$

$$W_{iti} = W_{eq} \quad \Delta = \frac{\delta}{L} \quad \mu = \frac{\delta_i}{\delta_y} = \frac{\Delta_i}{\Delta_y}$$



$$k_e \cdot \delta_y \cdot \delta_i - \frac{k_e \cdot \delta_y^2}{2} = \frac{k_e \cdot \delta_{eq}^2}{2}$$

$$2 \cdot \delta_y \cdot \delta_i - \delta_y^2 = \delta_{eq}^2$$

$$2 \cdot \mu \cdot \delta_y^2 - \delta_y^2 = \delta_{eq}^2$$

$$\delta_{eq} = \delta_y \cdot \sqrt{2 \cdot \mu - 1}$$

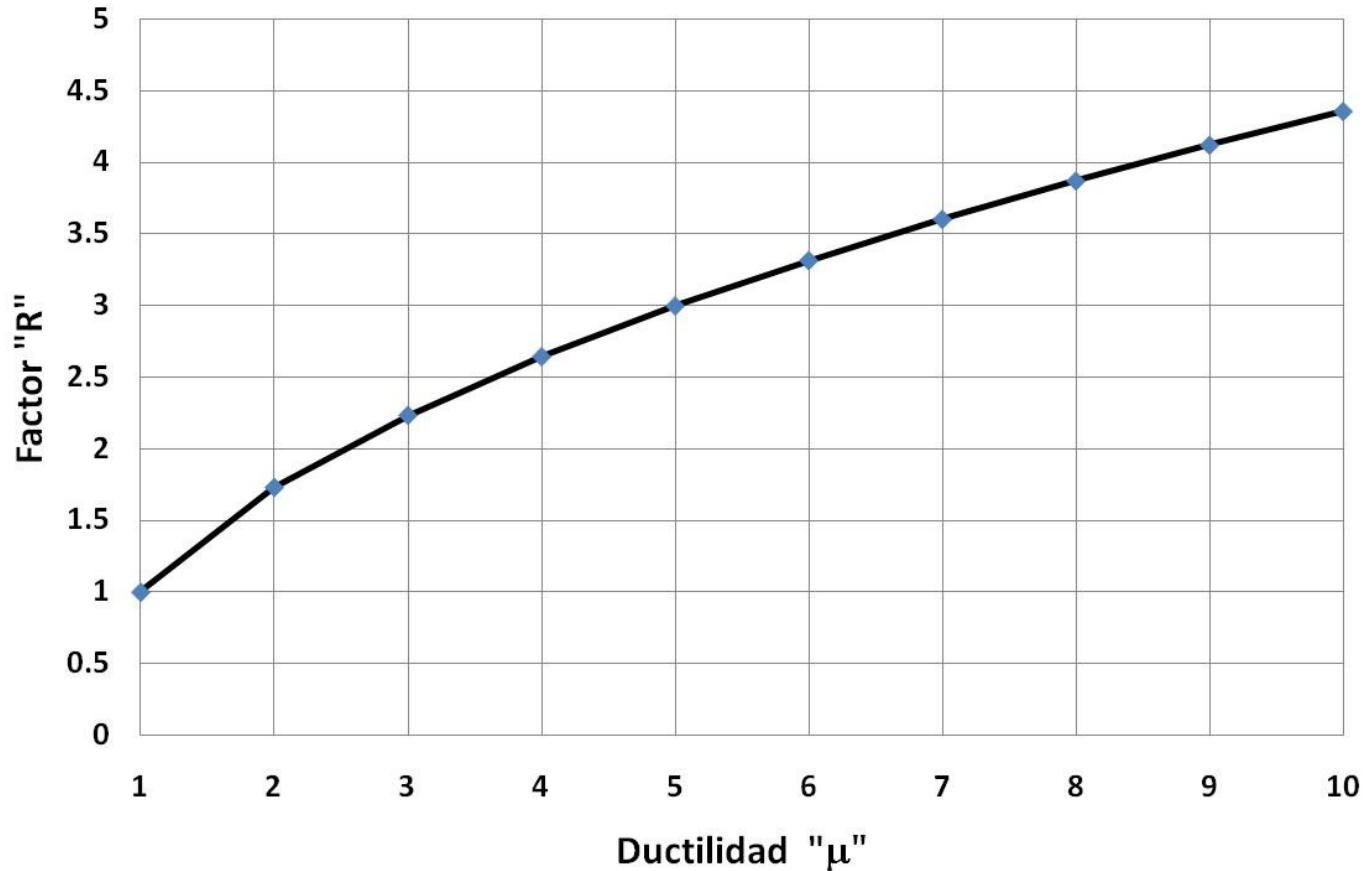
$$k_e \cdot \delta_{eq} = k_e \cdot \delta_y \cdot \sqrt{2 \cdot \mu - 1}$$

$$R = \frac{F_{eq}}{F_y} = \sqrt{2 \cdot \mu - 1}$$



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Relacion entre Ductilidad y Factor R para Estructuras No Redundantes y sin consideracion de los Efectos de Esbeltez  $P-\Delta$



$$\Delta = \frac{\delta}{L}$$

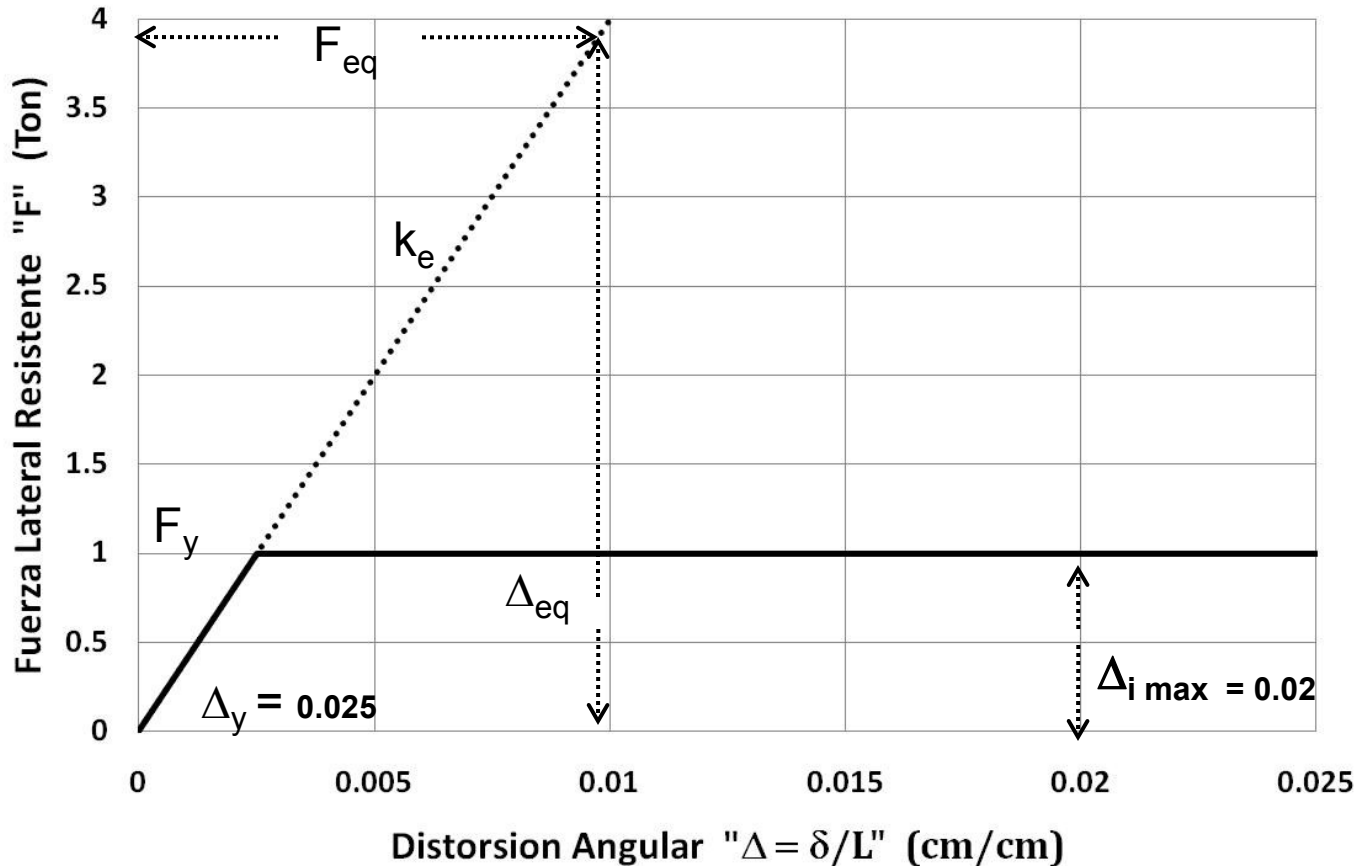
$$\mu = \frac{\delta_i}{\delta_y} = \frac{\Delta_i}{\Delta_y}$$

$$R = \frac{F_{eq}}{F_y} = \sqrt{2 \cdot \mu - 1}$$



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Curva de Capacidad para Estructuras No Redundantes y sin consideración de los Efectos de Esbeltez P- $\Delta$



$\Delta_i$	$\mu$	$F_{eq}$	$\Delta_{eq}$
0.0025	1	1.00	0.0025
0.005	2	1.73	0.0043
0.0075	3	2.24	0.0056
0.01	4	2.65	0.0066
0.0125	5	3.00	0.0075
0.015	6	3.32	0.0083
0.0175	7	3.61	0.0090
0.02	8	3.87	0.0097

$$k_e = 400 \text{ Ton/(m/m)}$$

$$\mu = \frac{\delta_i}{\delta_y} = \frac{\Delta_i}{\Delta_y} \quad \Delta = \frac{\delta}{L}$$

$$R = \frac{F_{eq}}{F_y} = \sqrt{2 \cdot \mu - 1}$$