Moment – Rotation Curve in Saddlebag Connections

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Abstract

In this paper the most important character of saddlebag type connection which is the moment – rotation relation has been driven based on the dimensions of its constitutive angles. An analytical model with three parameters has been chosen to present the moment – rotation relationship. The two first parameters are respectively the initial stiffness and ultimate moment capacity of the connection, the third one (shape parameter) has been determined by the least square method. Finally considering the test results and mathematical equations a practical method is proposed to determine the rigidity of all saddlebag type connection.

Key words: Steel structures, Connections, Semi-rigid connections, Saddlebag type connections.



	cm	cm		cm	
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$$M = Ph \qquad () \qquad M \left(\theta_{r}\right) = \frac{R_{1}\theta_{r}}{\left[1 + \left(\frac{\theta_{r}}{\theta_{h}}\right)^{s}\right]^{1/n}} + R_{1p} \theta_{r} \qquad ()$$

$$\frac{M}{\theta} = \frac{h^{3}P}{2\Delta} \qquad () \qquad \vdots$$

$$R_{h} \qquad M = R_{h}\theta \qquad R_{1} = R_{10} - R_{10} \qquad (-)$$

$$R_{h} \qquad M = R_{h}\theta \qquad R_{1} = R_{10} - R_{10} \qquad (-)$$

$$R_{h} \qquad H = R_{h}\theta \qquad R_{1} = R_{10} - R_{10} \qquad (-)$$

$$() \qquad e^{-\frac{M_{10}}{R_{10}}} \qquad (-) \qquad \vdots$$

$$() \qquad () \qquad R_{10} = 0$$

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 $\sigma_y = 2300 \ kg \ / \ cm^2 \ E = 2.1 \times 10^6 \ kg \ / \ cm^2$

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	а	с	a'	b	t _a	h	$t cm / radian R_{ki}$		
	cm	cm	cm	cm	Cm	cm		()	
S					1		1	1	
S				1	1		1	1	
S	*	1	1		1		1	1	
S		1	1	1	1				
S	*	1	1	1	1		1	1	
$P_{v} = bt\tau_{y}$ $T_{v} = P_{v}h =$: ($bth \tau_y =$) (- $\frac{bth}{\sqrt{3}}\sigma_y$)				$P_{t} = T_{b} + T_{b}$	-) Pv (Tv) +	a
(T _T):		а а) (-			-	$M_b = -\frac{M_b}{2}$	$\frac{r}{C} = \frac{\sigma_y b^2 t}{6}$	(c) - Pb b b	(•) -
<u> </u>	b	/				$T_b = 1$	$P_b h = \frac{M_b}{k a} h = \frac{h b^2 t}{6 k a}$	$\sigma_{_y}$	(
			-						

(T_v)

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$$R(\theta_r) = \frac{dM}{d\theta_r} = \frac{R_{ki}\theta_o}{\left[1 + \left(\frac{\theta_r}{\theta_o}\right)^n\right]^{\frac{n+1}{n}}}$$
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$$M_{u} = T_{b} + T_{v} + T_{T}$$

$$M_{u} = \left[\frac{b^{2}ht}{6ka} + \frac{bth}{\sqrt{3}} + \frac{4bt^{2}}{3\sqrt{3}}\right]\sigma_{y} \qquad ()$$

$$k$$

$$\frac{1}{2}$$

$$\sigma_{\rm y} = 2300 \, \rm kg/cm^2$$

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$$E(n) = \sum_{k=1}^{N} \left\{ \frac{R_{ki}(\theta_r)_k}{\left[1 + \left(\frac{\theta_r}{\theta_\circ}\right)_k^n\right]^{1/n}} - M_k(\theta_r) \right\}^2 \quad ()$$

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$$E(x) = \sum_{k=1}^{m} \left[f(x_k) - y_k \right]^2$$
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 $M - \theta$

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$$M_{{}_{th}} M'_{ex}$$
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$$M_{FM} \cdot \theta_{ex}$$

$$\theta = \frac{M'}{M_{FM}} \times 100 \quad ()$$

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$$t_a$$

 $c = a - a'$
 $k = \frac{1}{3}$
 b_f
 α_{th}
 α_{ex}
 M'_{th}
 M'_{ex}
 $M_{FM} = \frac{wL^2}{12}$

u

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$$M(\theta_{r})$$

$$M_{u} \qquad () \qquad \theta_{r}$$

$$M_{u} \qquad () \qquad R_{ki}$$

$$\theta_{o} \qquad ()$$

$$\dots \qquad ()$$

$$n = 0.85 \qquad n$$

θ_{th} ()

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