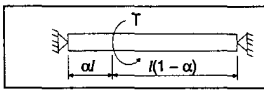
Case 3

$\alpha = 0.1$

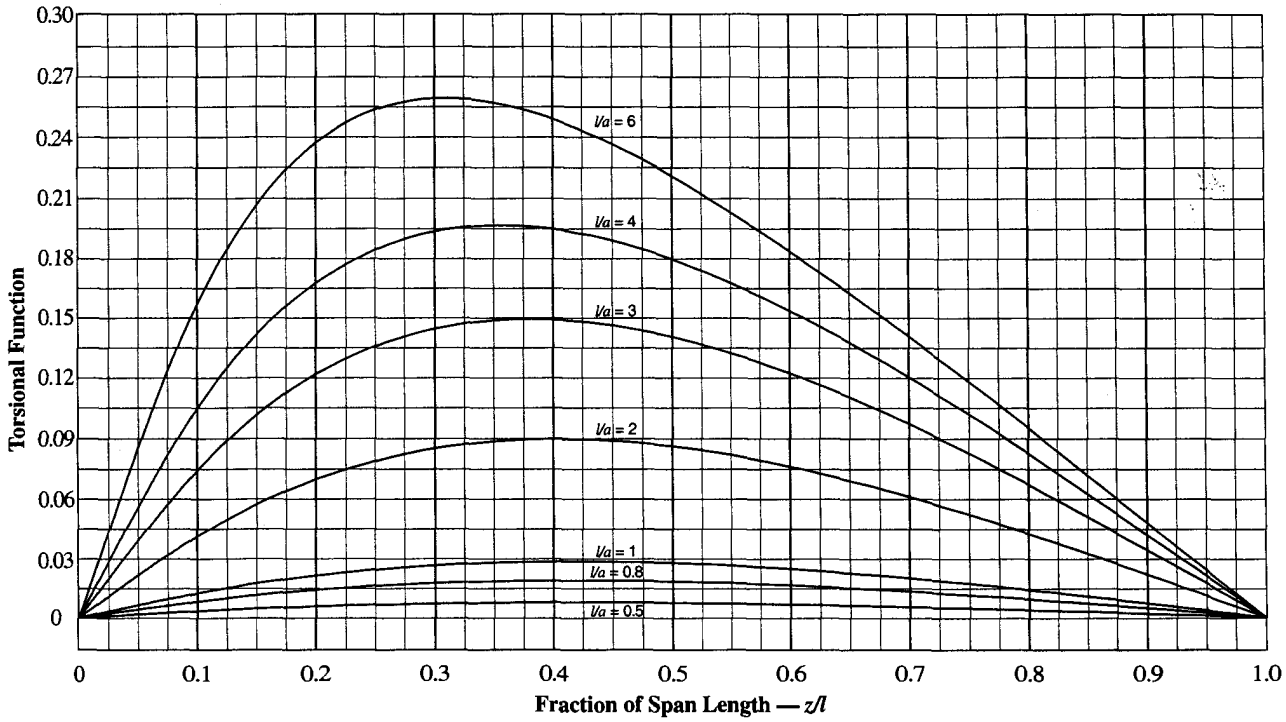
$$\theta \times \left(\frac{GJ}{T} \times \frac{5}{l}\right)$$



Torsional End Restraints	
Left End	Right End
Pinned $\theta = \theta' = 0$	Pinned $\theta' = 0$

Concentrated torque at $\alpha = 0.1$ on member with pinned ends.

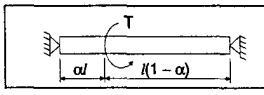
Rev. 3/1/03



Case 3

$\alpha = 0.1$

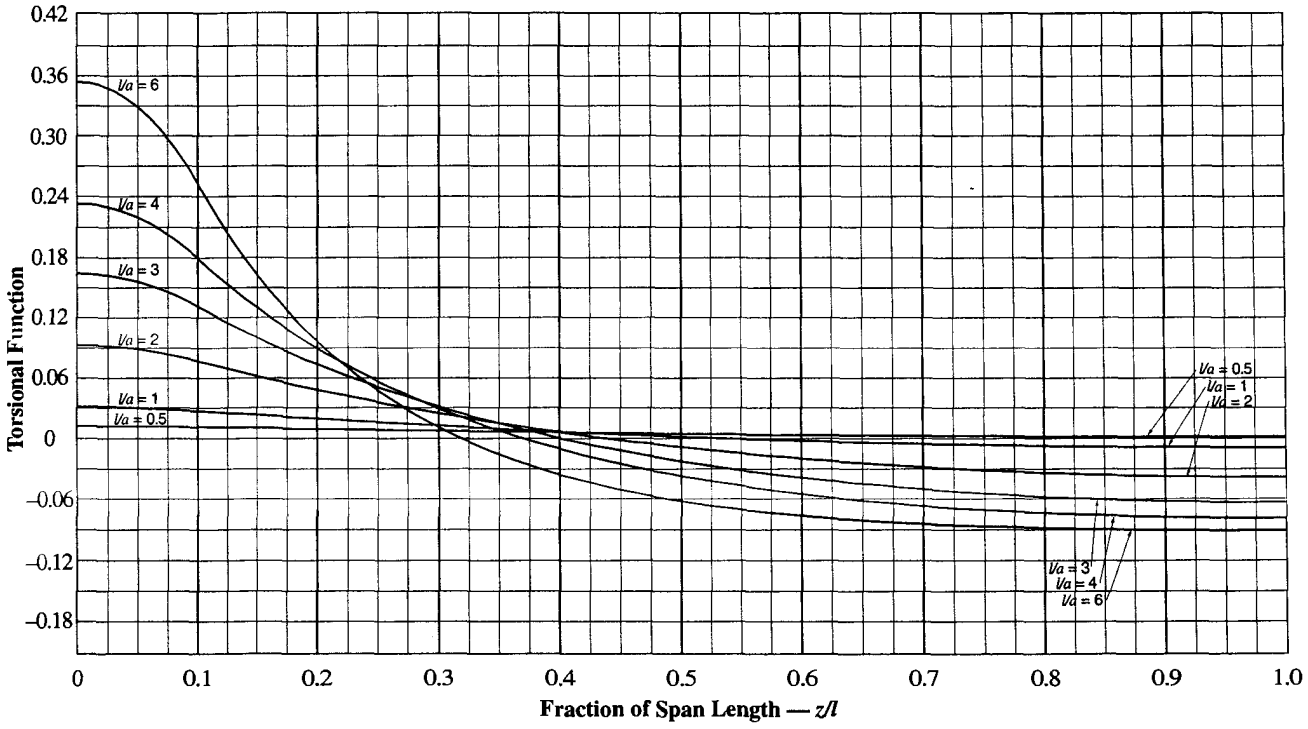
$$\theta' \times \left(\frac{GJ}{T}\right)$$



Torsional End Restraints	
Left End	Right End
Pinned $\theta = \theta' = 0$	Pinned $\theta' = 0$

Concentrated torque at $\alpha = 0.1$ on member with pinned ends.

Rev. 3/1/03



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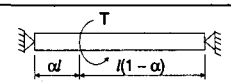
Case3

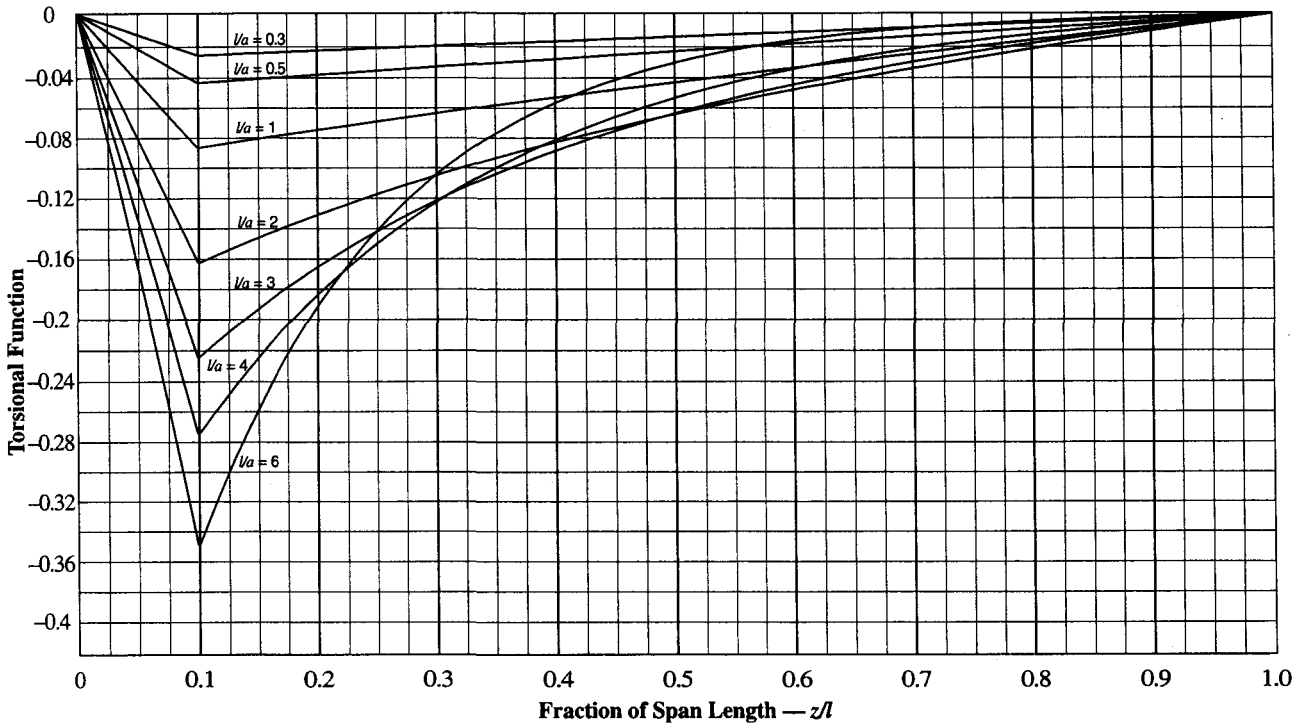
$\alpha = 0.1$

$$\theta'' \times \left(\frac{GJ}{T} \times a\right)$$



Torsional End Restraints		Concentrated torque at $\alpha = 0.1$ on member with pinned ends.
Left End	Right End	
Pinned $\theta = \theta' = 0$	Pinned $\theta' = 0$	

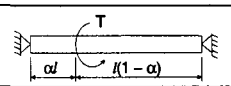
Rev. 3/1/03



Case3

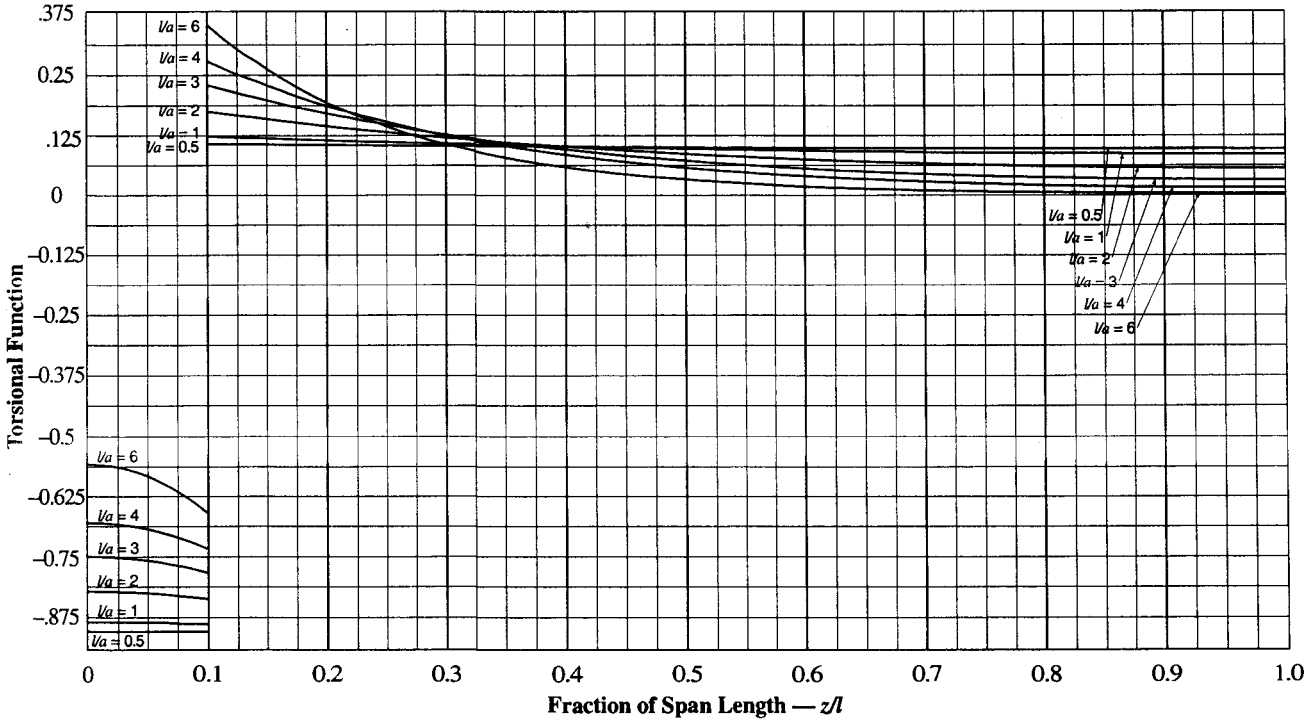
$\alpha = 0.1$

$$\theta''' \times \left(\frac{GJ}{T} \times a^2\right)$$



Torsional End Restraints		Concentrated torque at $\alpha = 0.1$ on member with pinned ends.
Left End	Right End	
Pinned $\theta = \theta' = 0$	Pinned $\theta' = 0$	

Rev. 3/1/03



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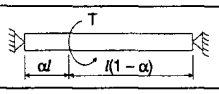
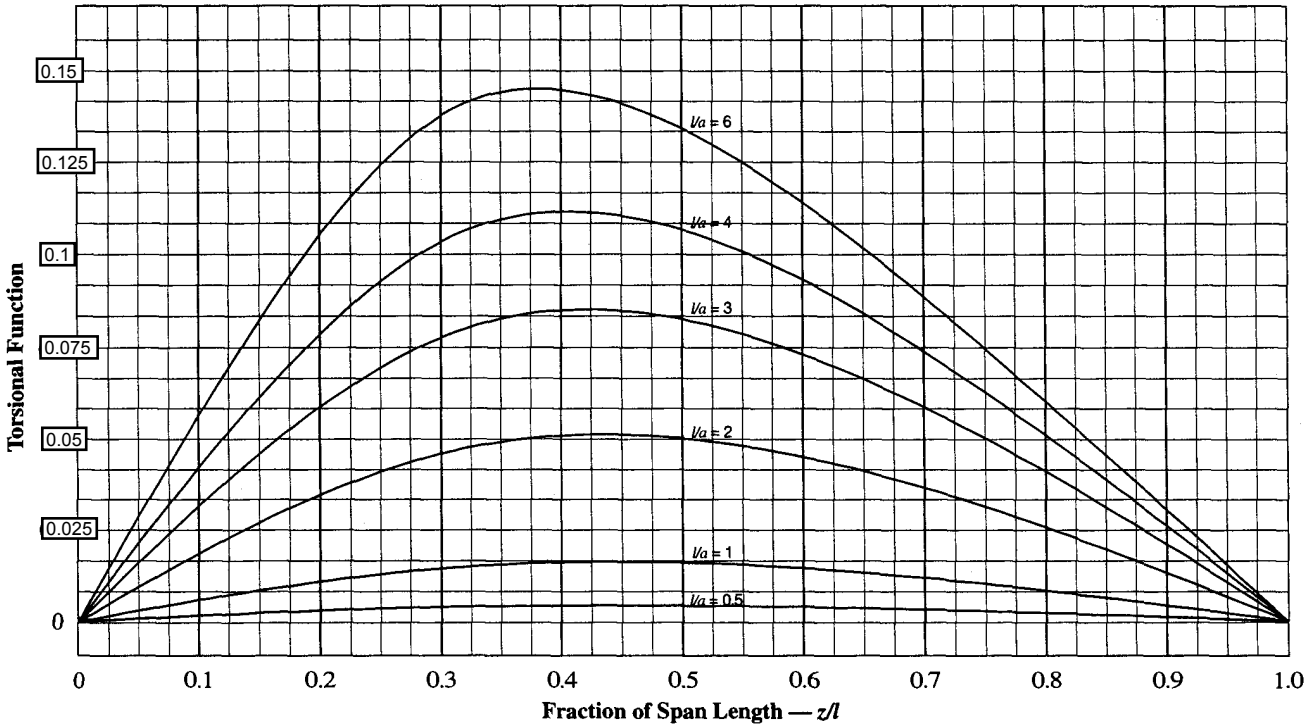
Case 3

$\alpha = 0.3$

$$\theta \times \left(\frac{GJ}{T} \times \frac{1}{l}\right)$$



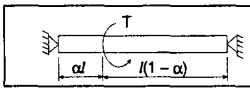
Torsional End Restraints		Concentrated torque at $\alpha = 0.3$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



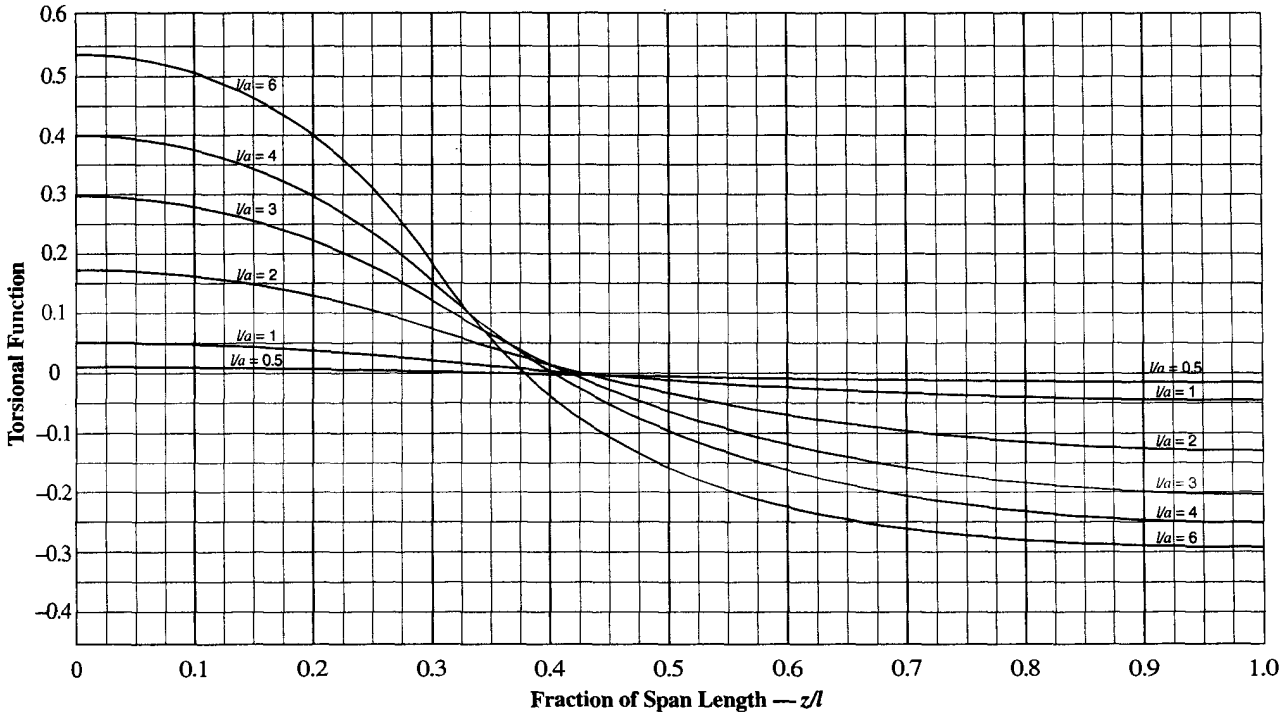
Case 3

$\alpha = 0.3$

$$\theta' \times \left(\frac{GJ}{T}\right)$$



Torsional End Restraints		Concentrated torque at $\alpha = 0.3$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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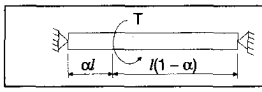
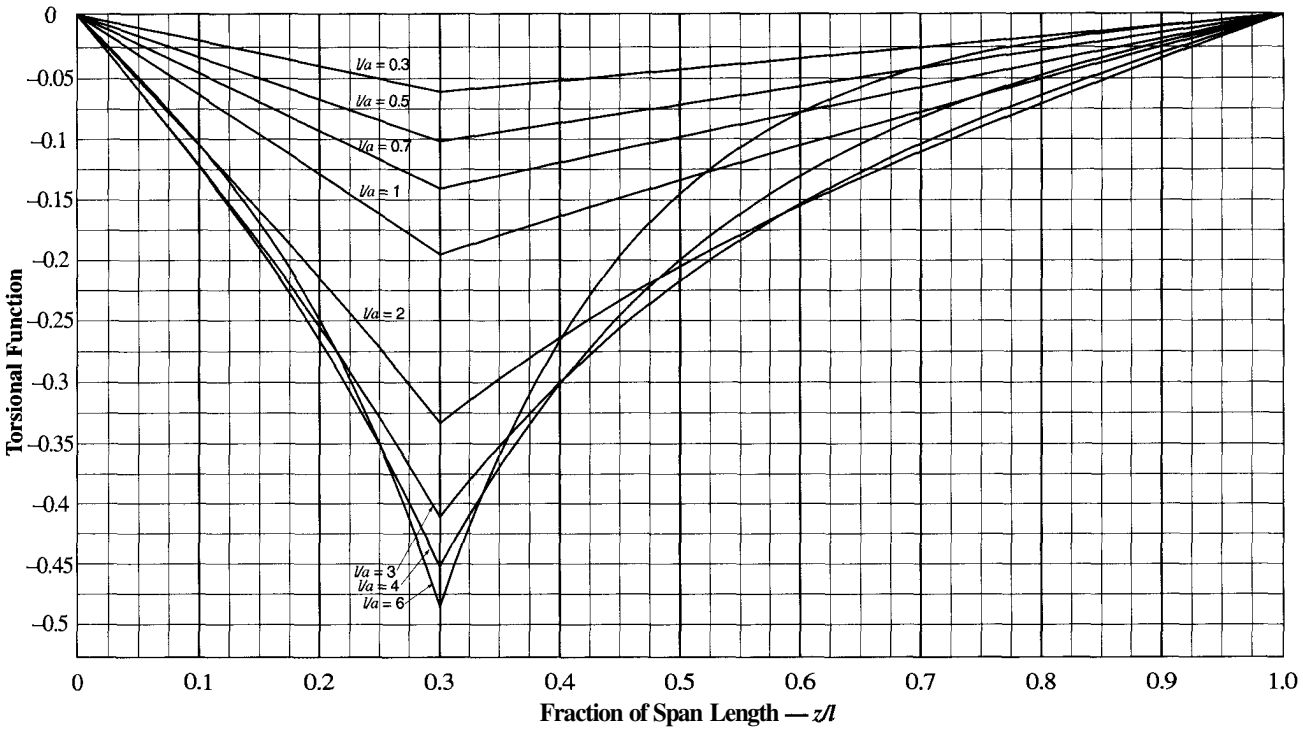
Case 3

$\alpha = 0.3$

$$\theta'' \times \left(\frac{GJ}{T} \times a\right)$$



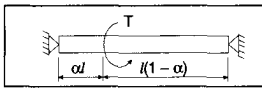
Torsional End Restraints		Concentrated torque at $\alpha = 0.3$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



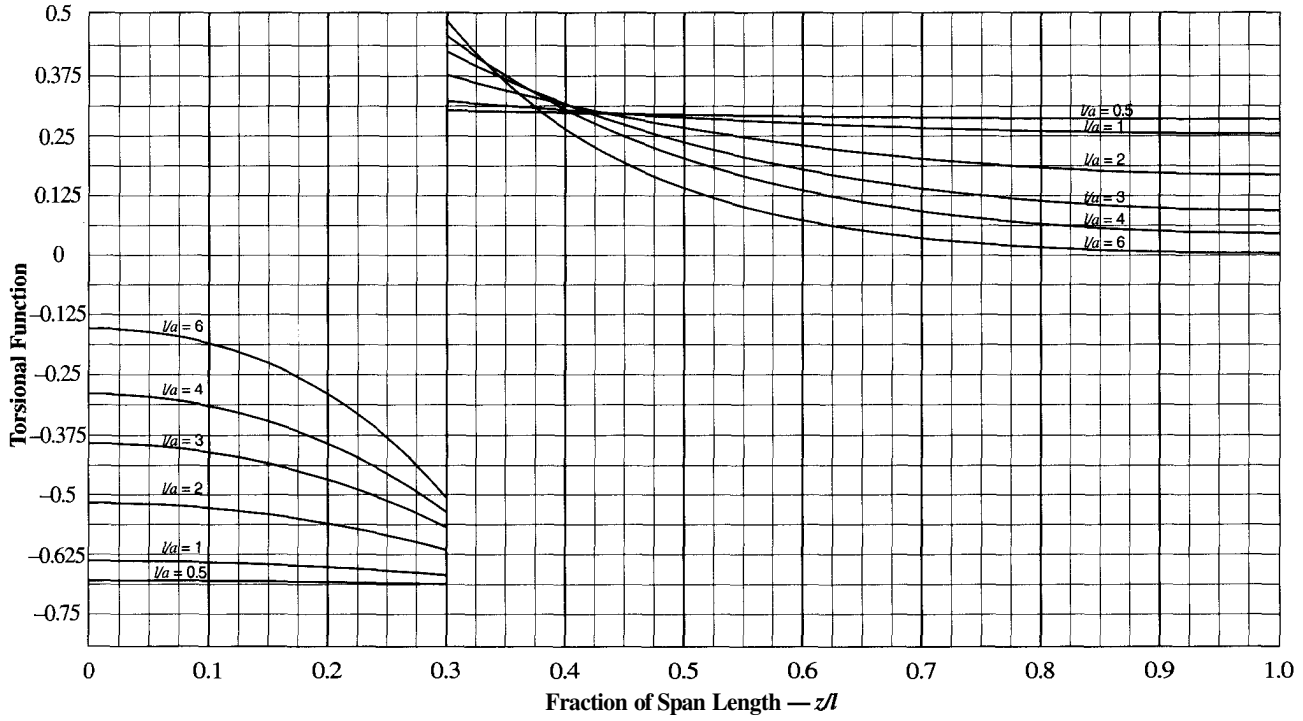
Case 3

$\alpha = 0.3$

$$\theta''' \times \left(\frac{GJ}{T} \times a^2\right)$$



Torsional End Restraints		Concentrated torque at $\alpha = 0.3$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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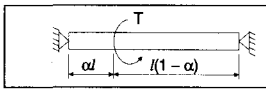
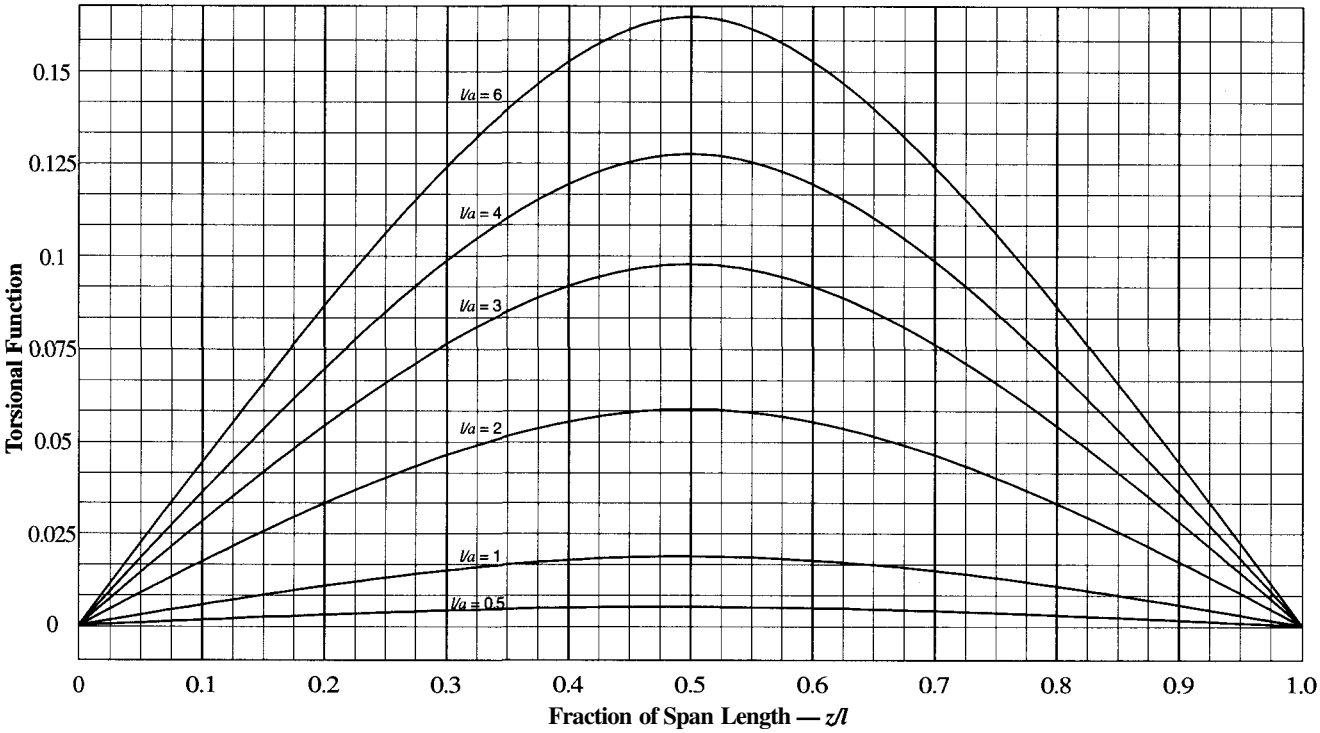
Case3

$\alpha = 0.5$

$$\theta \times \left(\frac{GJ}{T} \times \frac{1}{l} \right)$$



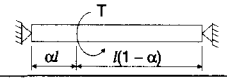
Torsional End Restraints		Concentrated torque at $\alpha = 0.5$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



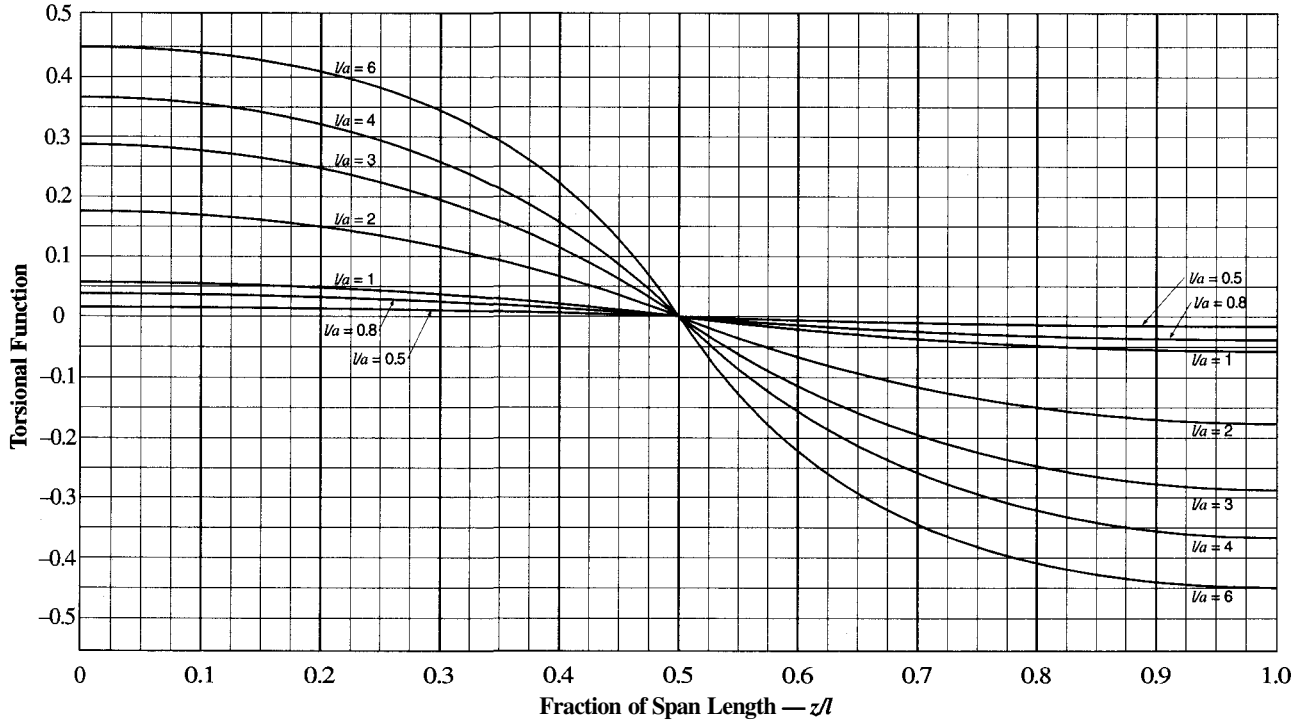
Case3

$\alpha = 0.5$

$$\theta' \times \left(\frac{GJ}{T} \right)$$



Torsional End Restraints		Concentrated torque at $\alpha = 0.5$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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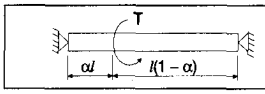
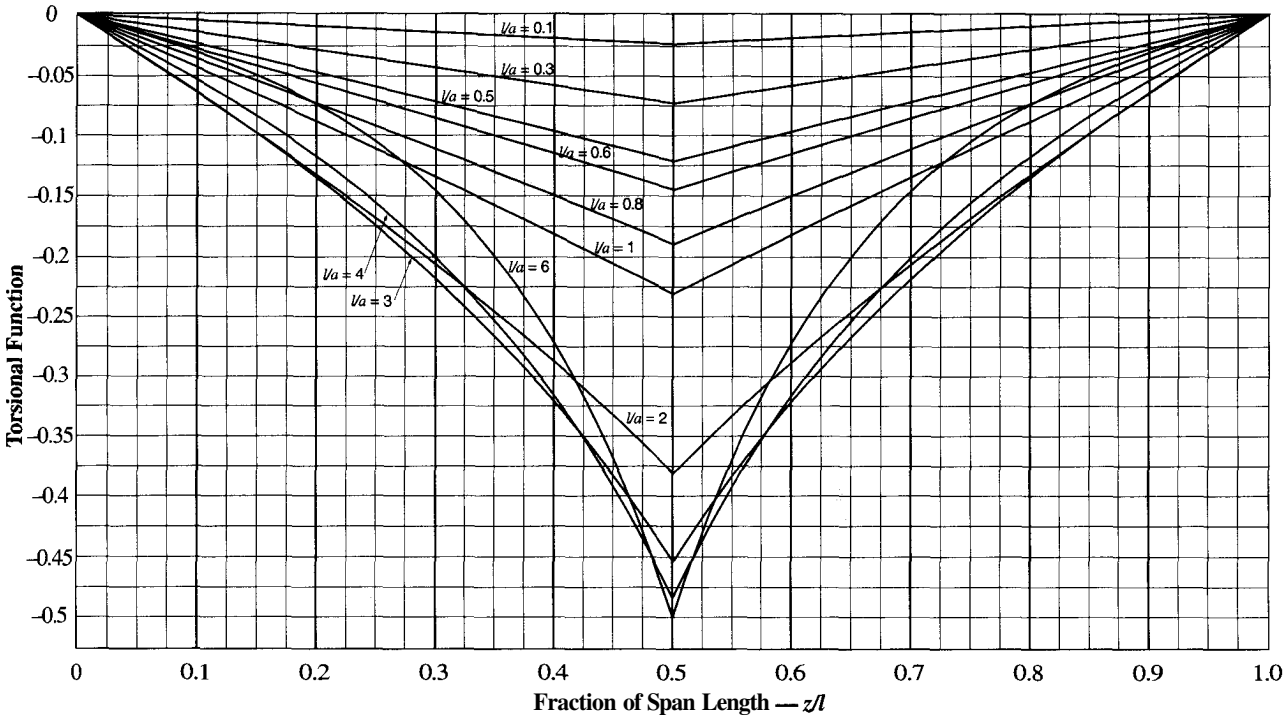
Case3

$\alpha = 0.5$

$$\theta'' \times \left(\frac{GJ}{T} \times a \right)$$



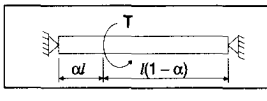
Torsional End Restraints		Concentrated torque at $\alpha = 0.5$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



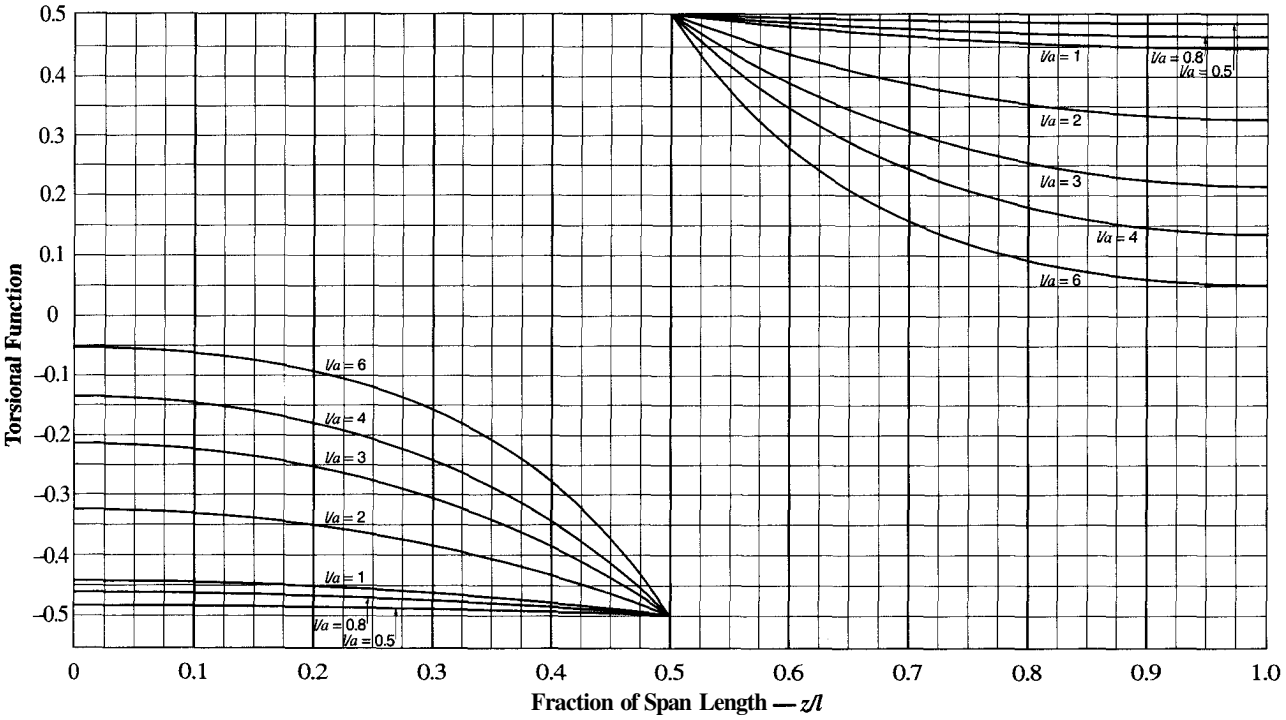
Case3

$\alpha = 0.5$

$$\theta''' \times \left(\frac{GJ}{T} \times a^2 \right)$$



Torsional End Restraints		Concentrated torque at $\alpha = 0.5$ on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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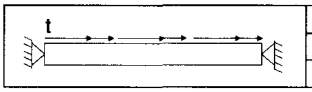
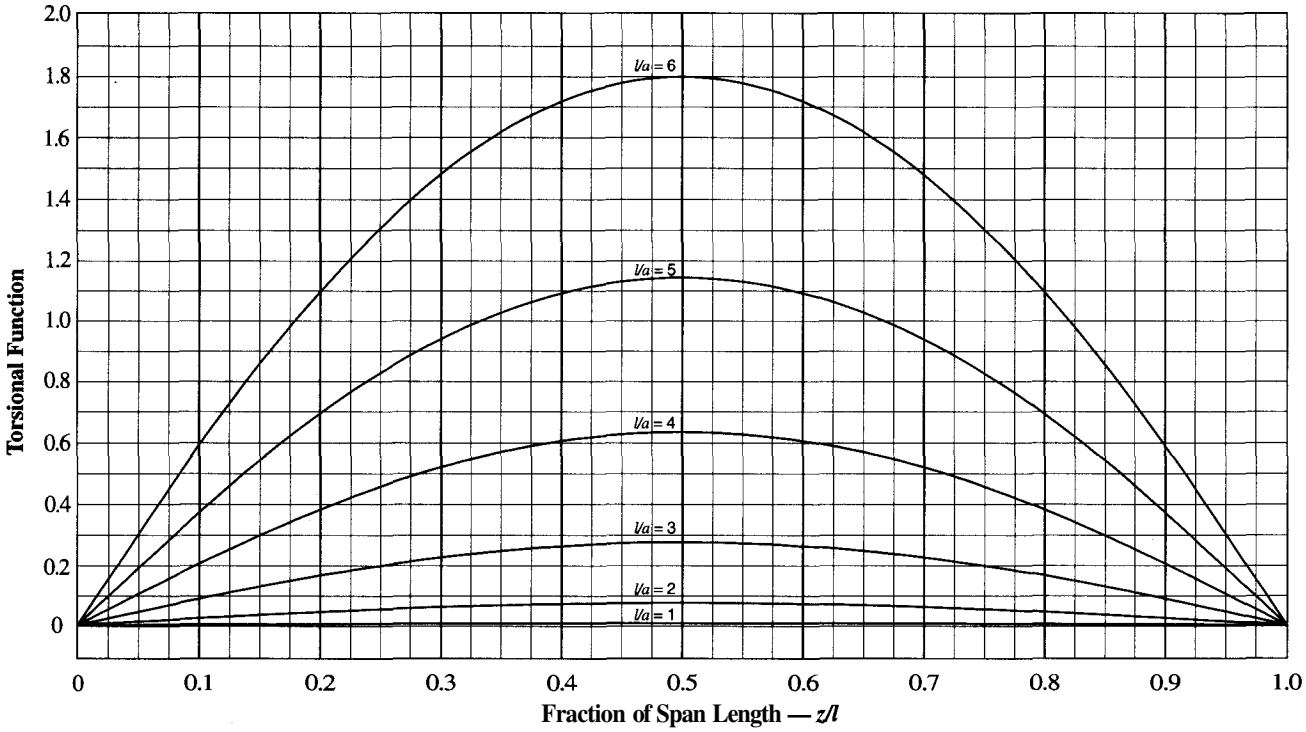
Case 4

$$\theta \times \left(\frac{GJ}{t} \times \frac{1}{2a^2} \right)$$

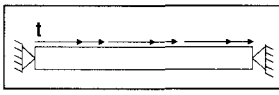


Torsional End Restraints		Uniformly distributed torque on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	

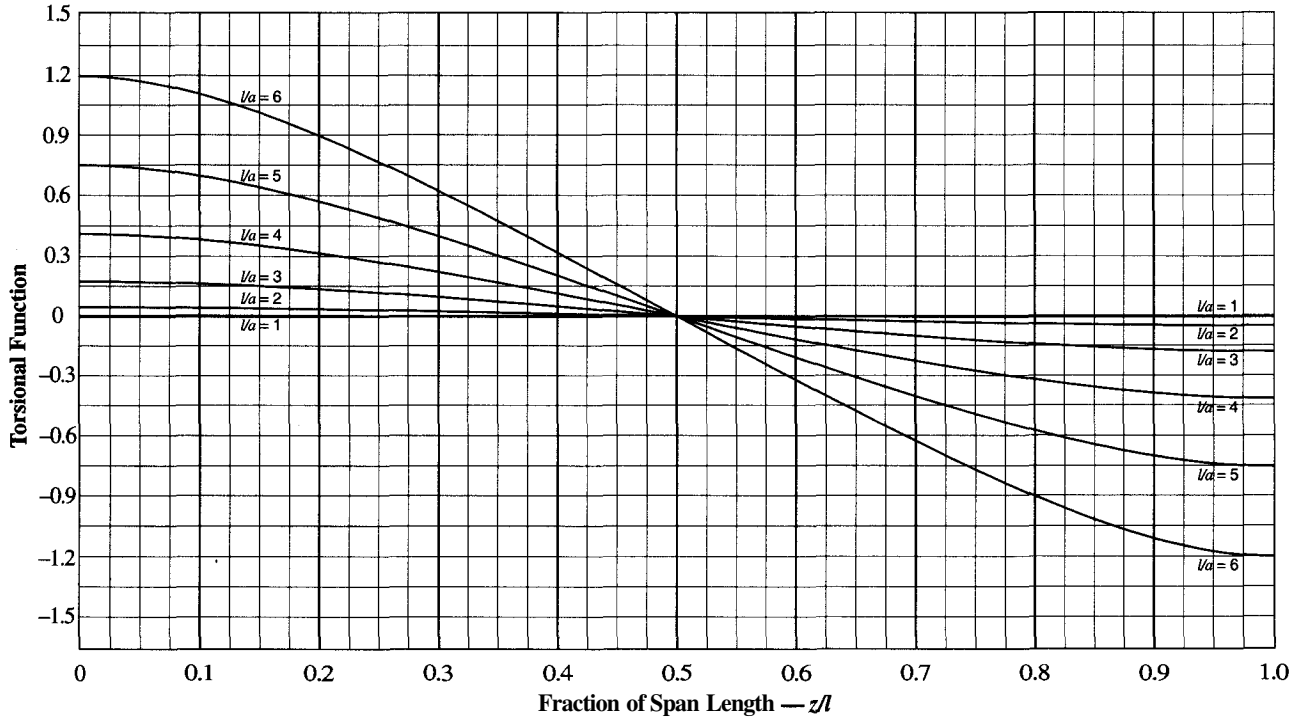


Case 4

$$\theta' \times \left(\frac{GJ}{t} \times \frac{l}{10a^2} \right)$$



Torsional End Restraints		Uniformly distributed torque on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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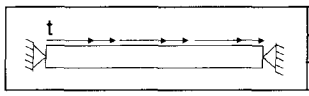
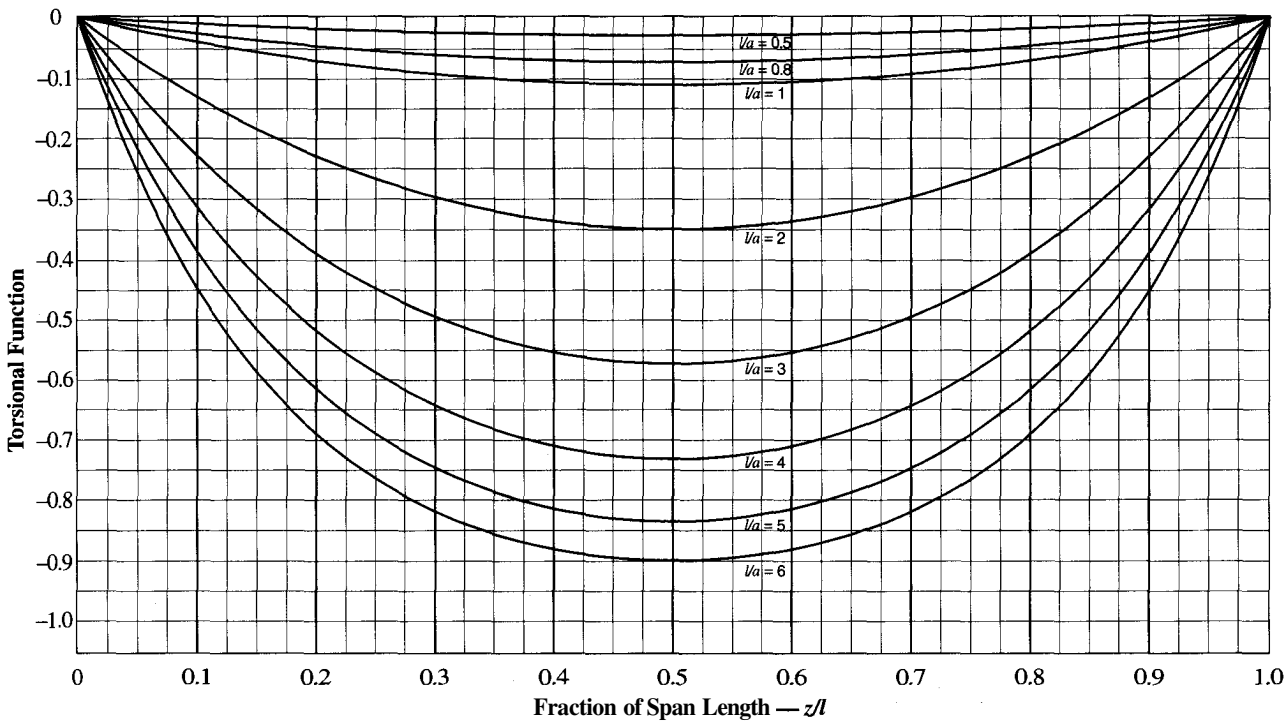
Case 4

$$\theta'' \times \left(\frac{GJ}{t}\right)$$

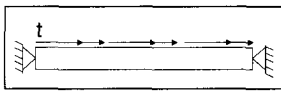


Torsional End Restraints		Uniformly distributed torque on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	

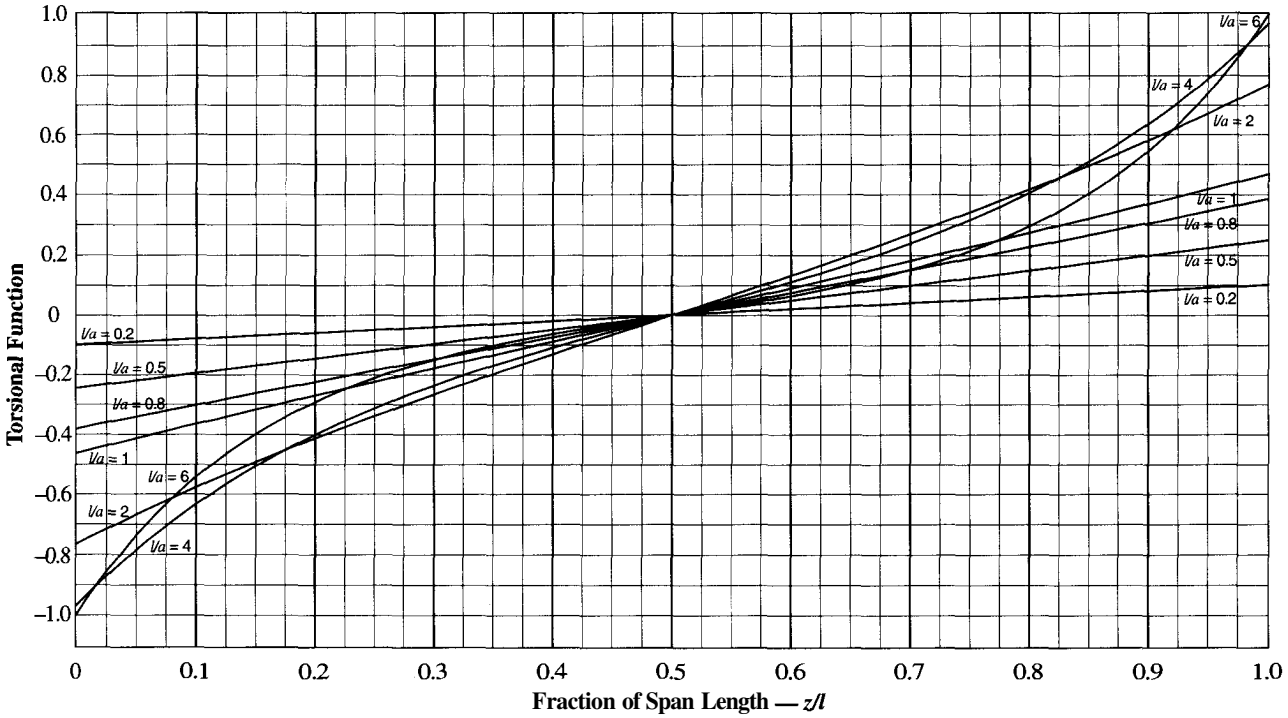


Case 4

$$\theta''' \times \left(\frac{GJ}{t} \times a\right)$$



Torsional End Restraints		Uniformly distributed torque on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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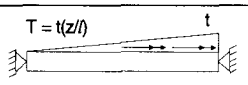
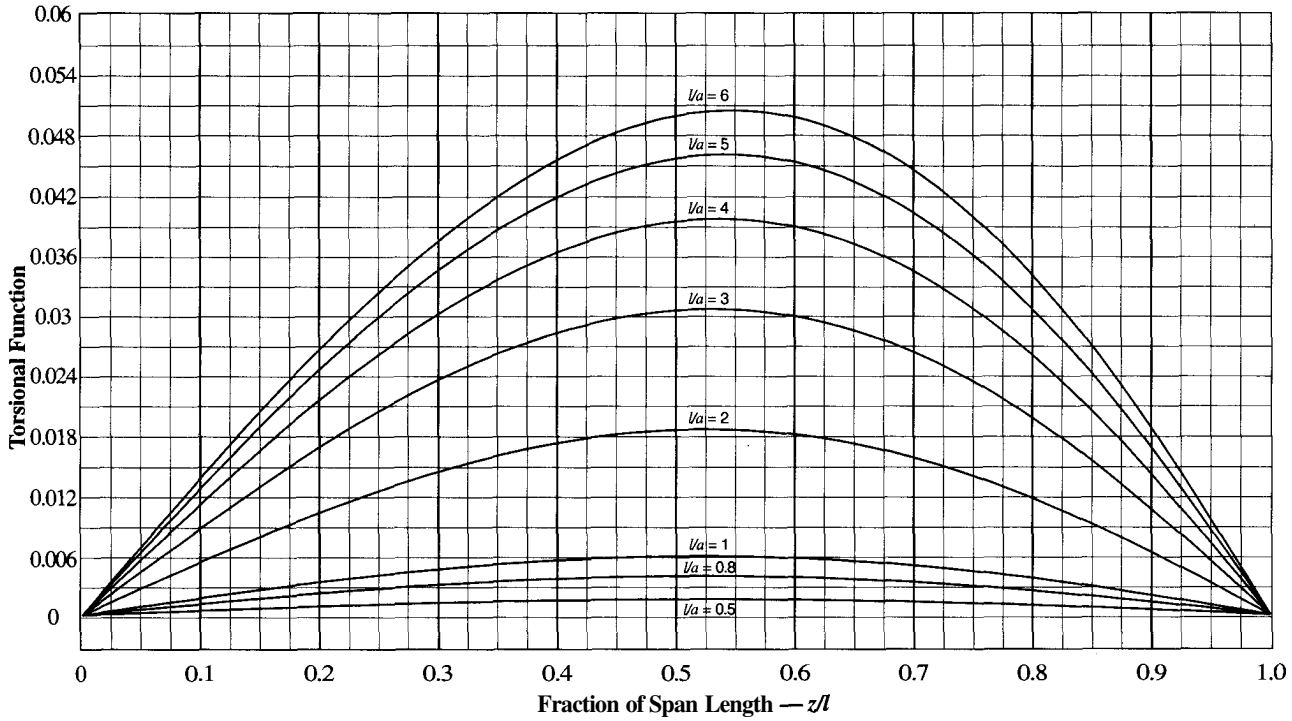
Case 5

$$\theta \times \left(\frac{GJ}{t} \times \frac{1}{l^2} \right)$$



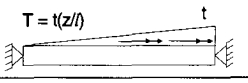
Torsional End Restraints	
Left End	Right End
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$

Linearly varying torque on member with pinned ends



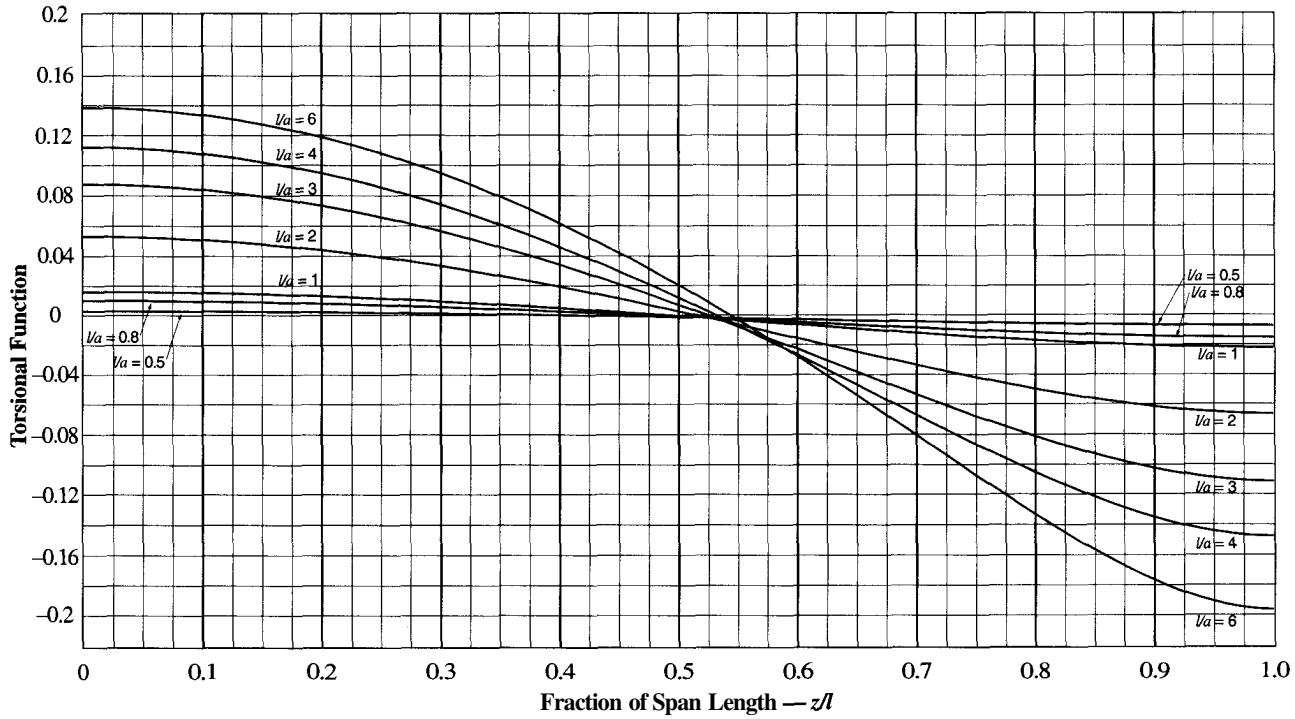
Case 5

$$\theta' \times \left(\frac{GJ}{t} \times \frac{1}{l} \right)$$



Torsional End Restraints	
Left End	Right End
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$

Linearly varying torque on member with pinned ends



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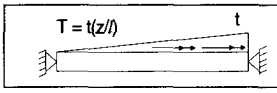
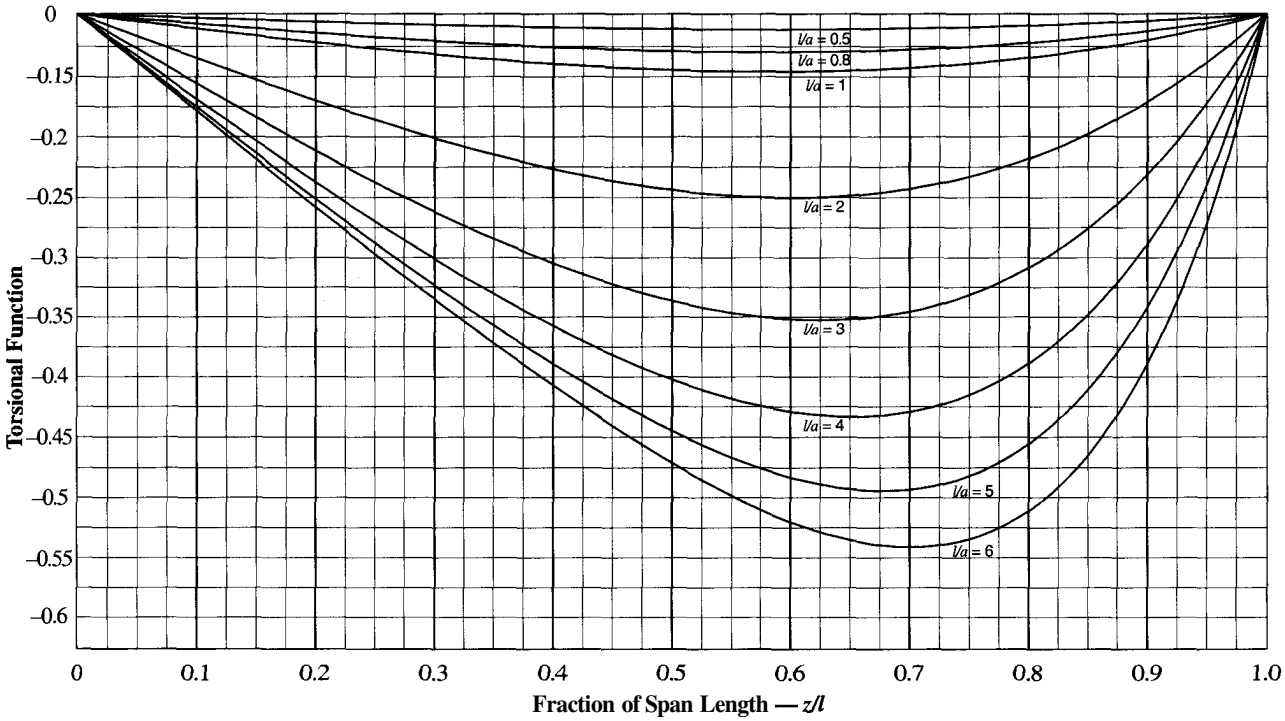
Case 5

$$\theta'' \times \left(\frac{GJ}{t}\right)$$

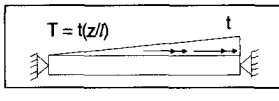


Torsional End Restraints		Linearly varying torque on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	

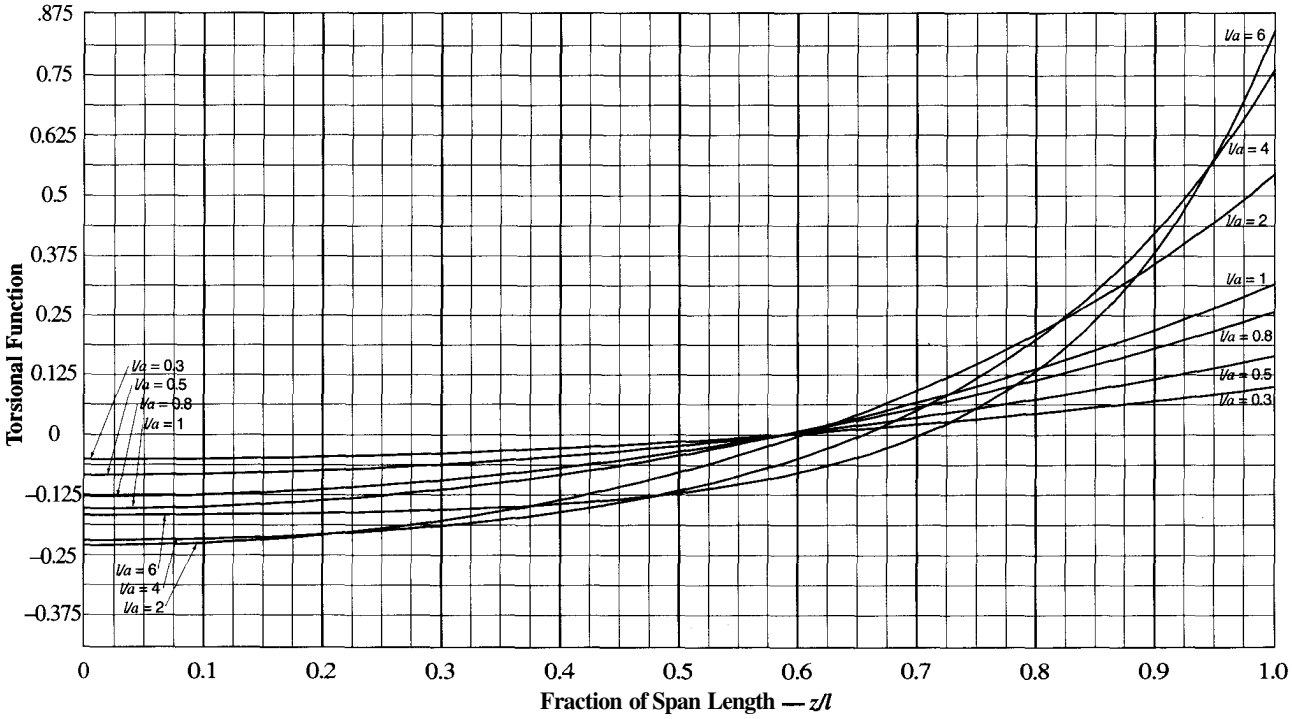


Case 5

$$\theta''' \times \left(\frac{GJ}{t} \times a\right)$$



Torsional End Restraints		Linearly varying torque on member with pinned ends
Left End	Right End	
Pinned $\theta = \theta'' = 0$	Pinned $\theta = \theta'' = 0$	



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