Die Statik im Stahlbetonbau

Beyer, Kurt

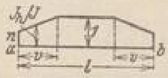
Berlin [u.a.], 1956

Lösung für gerade Stäbe mit unstetig veränderlichem Jh/J

urn:nbn:de:hbz:466:1-74292

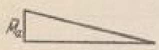
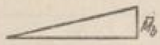
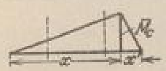
Lösung für gerade Stäbe mit unstetig veränderlichem J_h/J.

Tabelle 14a. $\int_0^l M\overline{M}\frac{J_c}{J}dx$ für veränderliches $\frac{J_h}{J}$ an beiden Stabenden.

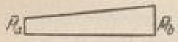


$$\frac{J_h}{J}=\zeta=1-(1-n)\frac{v-x}{v}=1-(1-n)\left(1-\frac{\xi}{\nu}\right)$$

$$\xi=\frac{x}{l},\quad \xi'=\frac{x'}{l},\quad \frac{v}{l}=\nu,\quad \frac{l-v}{l}=\nu',\quad l'=l\frac{J_c}{J_h},\quad n=\frac{J_h}{J_a}$$

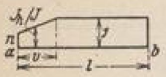
	$\frac{1}{6}M_a\overline{M}_a[2-(1-n)\nu(2+\nu'^2)]\,l'$		$\frac{1}{6}M_a\overline{M}_b[1-(1-n)\nu^2(2-\nu)]\,l'$
	$\frac{1}{2}M_a\overline{M}_a[1-(1-n)\nu]\,l'$		$\frac{1}{3}M_a\overline{M}_c[1-(1-n)\nu^2(2-\nu)]\,l'$
	$\frac{1}{12}M_a\overline{M}_c\left[2(1+\xi')-(1-n)\frac{\nu^2}{\omega_R}(\nu+2\nu'\xi')\right]l'$		
	$\frac{1}{12}M_a\overline{M}_c\left\{2(1+\xi')-(1-n)\frac{1}{\xi'}\left[2\nu(2+\nu'^2)+\frac{\xi^2}{\nu}(1+\xi')-2\xi(2+\xi')\right]\right\}l'$		
	$\frac{1}{12}M_a\overline{M}_c\left\{2(1+\xi')-(1-n)\frac{1}{\xi}\left[2\nu^2(2-\nu)+\frac{\xi'^3}{\nu}-2\xi'^2\right]\right\}l'$		

	$M_a\overline{M}_a[1-(1-n)\nu]\,l'$		$\frac{1}{12}M_a\overline{M}_c\left[6-(1-n)\frac{2\nu^2}{\omega_R}\right]l'$
	$\frac{1}{6}M_a\overline{M}_c\left\{3-\frac{1-n}{\xi'}\left[3(\nu-\xi)+\frac{\xi^2}{\nu}\right]\right\}l'$		

	$\frac{1}{6}\{(M_a\overline{M}_a+M_b\overline{M}_b)[2-(1-n)\nu(2+\nu'^2)]+(M_a\overline{M}_b+M_b\overline{M}_a)[1-(1-n)\nu^2(2-\nu)]\}\,l'$		
	$\frac{1}{2}(M_a+M_b)\overline{M}_a[1-(1-n)\nu]\,l'$		$\frac{1}{3}(M_a+M_b)\overline{M}_c\cdot[1-(1-n)\nu^2(2-\nu)]\,l'$

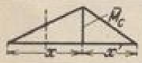
	$\frac{1}{15}M_c\overline{M}_c\left\{5(1+\omega_R)-(1-n)\frac{1}{\xi'}\left[5\nu^2(2-\nu)+\xi^2\left(\frac{\xi}{\nu}(5-3\xi)-5(2-\xi)\right)\right]\right\}l'$
	$\frac{1}{15}M_c\overline{M}_c\left[5(1+\omega_R)-(1-n)\frac{\nu^3(5-3\nu)}{\omega_R}\right]l'$
	$\frac{8}{15}M_c\overline{M}_c[1-(1-n)\nu^3(5-6\nu+2\nu^2)]\,l'$

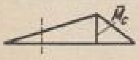
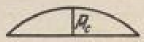
Tabelle 14b. $\int_0^l M \overline{M} \frac{J_c}{J} dx$ für veränderliches $\frac{J_h}{J}$ an einem Stabende.



$$\frac{J_h}{J} = \zeta = 1 - (1-n)\frac{v-x}{v} = 1 - (1-n)\left(1 - \frac{\xi}{\nu}\right),$$

$$\xi = \frac{x}{l}, \quad \xi' = \frac{x'}{l}, \quad \nu = \frac{v}{l}, \quad \nu' = \frac{l-v}{l}, \quad l' = l\frac{J_c}{J_h}, \quad n = \frac{J_h}{J_a}$$

	$\frac{1}{6} M_a \overline{M}_a [3 - (1-n)\nu(3-\nu)]\, l'$		$\frac{1}{12} M_a \overline{M}_b [2 - (1-n)\nu^2(2-\nu)]\, l'$
	$\frac{1}{12} M_a \overline{M}_a \{4 - (1-n)\nu[2 + (2-\nu)^2]\}\, l'$		
	$\frac{1}{12} M_a \overline{M}_c \left[2(1+\xi') - (1-n)\frac{\nu^2}{\xi}(2-\nu)\right] l'$		
	$\frac{1}{12} M_a \overline{M}_c \left\{2(1+\xi') - \frac{1-n}{\xi'}\left[\nu(2+(2-\nu)^2) + \frac{\xi^2}{\nu}(1+\xi') - 2\xi(2+\xi')\right]\right\} l'$		
	$\frac{1}{15} M_a \overline{M}_c [5 - (1-n)\nu^2(10\nu' + 3\nu^2)]\, l'$		

	$\frac{1}{12} M_b \overline{M}_b [4 - (1-n)\nu^3]\, l'$		$\frac{1}{6} M_b \overline{M}_a [3 - (1-n)\nu^2]\, l'$
	$\frac{1}{12} M_b \overline{M}_c \left\{2(1+\xi) - (1-n)\frac{1}{\xi'}\left[\nu^2(2-\nu) - \xi^2\left(2 - \frac{\xi}{\nu}\right)\right]\right\} l'$		
	$\frac{1}{12} M_b \overline{M}_c \left[2(1+\xi) - (1-n)\frac{\nu^3}{\xi}\right] l'$		$\frac{1}{15} M_b \overline{M}_c [5 - (1-n)\nu^3(5-3\nu)]\, l$

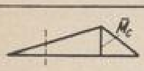
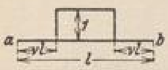
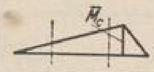
	$\frac{1}{15} M_c \overline{M}_c \left[5(1+\omega_R) - (1-n)\frac{\nu^3}{\xi}(5-3\nu)\right] l'$
	$\frac{1}{15} M_c \overline{M}_c \left\{5(1+\omega_R) - \frac{1-n}{\xi'}\left[\frac{\xi^3}{\nu}(5-3\xi) - 5\xi^2(2-\xi) + \nu^2(10\nu' + 3\nu^2)\right]\right\} l'$
	$\frac{4}{15} M_c \overline{M}_c [2 - (1-n)(5 - 6\nu + 2\nu^2)\nu^3]\, l'$

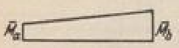
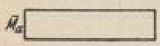
Tabelle 15a. $\int_0^l M\overline{M}\frac{J_c}{J}dx$ für unendlich großes Trägheitsmoment an beiden Stabenden.



$\frac{J_h}{J}$ $\qquad l' = l\frac{J_c}{J_h}$ $\qquad \nu' = 1-\nu$ $\qquad \xi = \frac{x}{l}$ $\quad \xi' = \frac{x'}{l}$

	$\frac{1}{3}M_a\overline{M}_a(1-2\nu)(1-\nu\nu')l'$		$\frac{1}{6}M_a\overline{M}_b(1-2\nu)(1+2\nu\nu')l'$
	$\frac{1}{6}M_a(1-2\nu)[2\overline{M}_a+\overline{M}_b-2(\overline{M}_a-\overline{M}_b)\nu\nu']l'$		
	$\frac{1}{6}M_a\overline{M}_c\left\{1+\xi'-\frac{\nu^2}{\omega_R}[3\xi'-2\nu(1-2\xi)]\right\}l' = \frac{1}{6}\frac{M_a\overline{M}_c}{\omega_R}\{\omega_D'-\nu^2[3\xi'-2\nu(1-2\xi)]\}l'$		
	$\frac{M_a\overline{M}_c}{3}(1-2\nu)(1+2\nu\nu')l'$		$\frac{1}{3}M_a\overline{M}_c\frac{1}{\xi'}(1-2\nu)(1-\nu\nu')l'$
	$\frac{1}{12}M_a\overline{M}_c\frac{1}{\xi}(1+2\omega_R-6\nu^2)l'$		$\frac{1}{6}M_a\overline{M}_c\frac{1}{\xi}(1-2\nu)(1+2\nu\nu')l'$
	$\frac{1}{12}M_a\overline{M}_c\frac{1}{\xi}\frac{\nu'-\nu}{\xi'-\xi}[1-6\xi^2+2\nu\nu']l'$		

	$M_a\overline{M}_a(1-2\nu)l'$		$\frac{1}{2}M_a\overline{M}_c\frac{1-2\nu}{\xi'}l'$
	$\frac{1}{2}M_a\overline{M}_c\left(1-\frac{\nu^2}{\omega_R}\right)l'$		

	$\frac{1}{6}(\nu'-\nu)[\overline{M}_a(2M_a+M_b)+\overline{M}_b(2M_b+M_a)-2\nu\nu'(\overline{M}_a-\overline{M}_b)(M_a-M_b)]l'$		
	$\frac{1}{2}\overline{M}_a(M_a+M_b)(1-2\nu)l'$		$\frac{1}{3}(M_a+M_b)\overline{M}_c(1-2\nu)(1+2\nu\nu')l'$

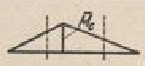
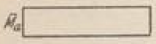
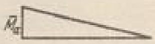
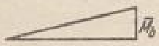
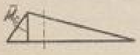
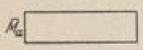
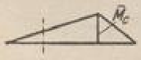
	$\frac{1}{3}M_c\overline{M}_c\frac{1}{\xi'}(1-2\nu)(1+2\nu\nu')l'$		$\frac{1}{3}\frac{M_c\overline{M}_c}{\omega_R}[\omega_P''-\nu^3(4-3\nu)]l'$

Tabelle 15b. $\int_0^l M \overline{M} \frac{J_c}{J} dx$ für unendlich großes Trägheitsmoment an einem Stabende.

 $\frac{J_h}{J}$	$l' = l \frac{J_c}{J_h}$	$\xi = \frac{x}{l}$	$\xi' = \frac{x'}{l}$
			
	$\frac{1}{2} M_a \overline{M}_a \nu'^2 l'$		$\frac{1}{3} M_a \overline{M}_a \nu'^3 l'$
	$\frac{1}{6} M_a \overline{M}_b \nu'^2 (3 - 2\nu') l'$		$\frac{1}{3} M_a \overline{M}_c [4\nu'^3 - 3\nu'^4] l'$
	$\frac{1}{3} M_a \overline{M}_c \frac{\nu'^3}{\xi'} l'$		$\frac{1}{6} M_a \overline{M}_c \frac{1}{\xi} [\nu'^2 (3-2\nu') - \nu\nu'\xi' - \nu'\xi'^2] l'$
			
	$\frac{1}{2} M_b \overline{M}_a (1 - \nu^2) l'$		$\frac{1}{3} M_b \overline{M}_b (1 + \nu + \nu^2) \nu' l'$
	$\frac{1}{6} M_b \overline{M}_c \frac{\nu'^2}{\xi'} (1 + 2\nu) l'$		$\frac{1}{6} M_a \overline{M}_c \left(1 + \xi - \frac{2\nu^3}{\xi}\right) l'$
	$\frac{1}{3} M_b \overline{M}_c [1 - \nu^3 (4 - 3\nu)] l'$		
			
	$M_a \overline{M}_a \nu' l'$		$\frac{1}{2} M_a \overline{M}_c \frac{\nu'^2}{\xi'} l'$
	$\frac{1}{2} M_a \overline{M}_c \left(1 - \frac{\nu^2}{\xi}\right) l'$		
			
	$\frac{\nu'}{6} \{M_a \nu' [2 \overline{M}_a \nu' + \overline{M}_b (1 + 2\nu)] + M_b [2 \overline{M}_b (1 + \nu + \nu^2) + \nu' \overline{M}_a (1 + 2\nu)]\} l'$		
	$M_a \frac{\nu'}{2} [\overline{M}_a (1 - \nu) + \overline{M}_b (1 + \nu)] l'$		
	$\frac{1}{3} \overline{M}_a [M_a (4\nu'^3 - 3\nu'^4) + M_b (1 - 4\nu^3 + 3\nu^4)] l'$		
			
	$\frac{1}{3} M_c \overline{M}_c \frac{\nu'^3}{\xi'} (4 - 3\nu') l'$		
	$\frac{1}{3} \frac{M_c \overline{M}_c}{\omega_R} [\omega''_P - \xi' \nu^3 (3 - 4\nu)] l'$		