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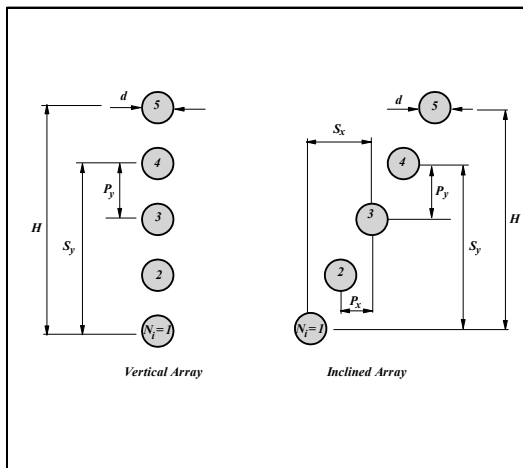
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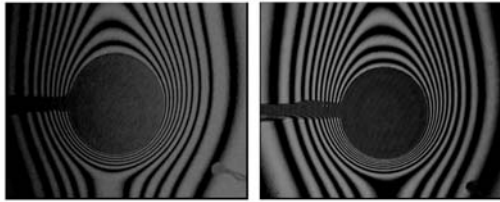
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$$\begin{matrix}
 d \\
 i \\
 N_i \\
 S_y \\
 P_y \\
 P_x \\
 S_x \\
 H \\
 P_x/d \\
 P_y/d
 \end{matrix}$$

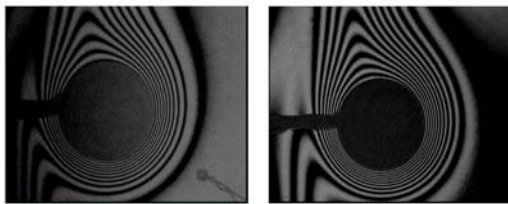
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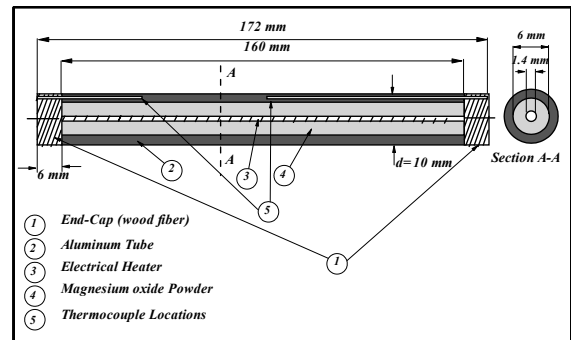
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$Ra = 3 \times 10^3$   
 $P_x/d=1$  ( ) ( )  $P_y/d=2$   
 $P_y/d=2$



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$$h_{\theta} = -k_w \frac{dT}{dr} \Big|_{r=0} \cdot \frac{l}{(T_w - T_{\infty})}$$

( )

$\theta$

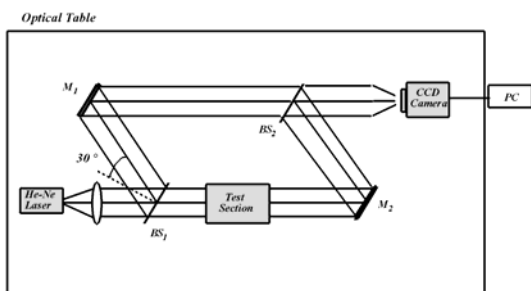
$h_{\theta}$

$k_w$

$T_w$

$$Nu_{\theta} = \frac{h_{\theta} d}{k_f} = - \frac{k_w d}{k_f (T_w - T_{\infty})} \cdot \frac{dT}{dr} \Big|_{r=0}$$

( )



mW

$$\nabla \cdot \bar{V}^* = 0$$

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$$(\bar{V}^* \cdot \nabla) \bar{V}^* = -\nabla P^* + \nabla^2 \bar{V}^* - \frac{Ra}{Pr} T^* \frac{\bar{g}}{g}$$

( )

$$(\bar{V}^* \cdot \nabla) T^* = \frac{1}{Pr} \nabla^2 T^*$$

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$$T_f = k_f$$

$$T_f = \frac{T_w - T_\infty}{2}$$

$$\bar{Nu}_o$$

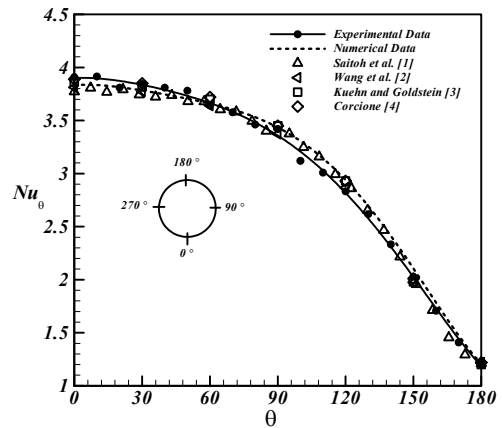
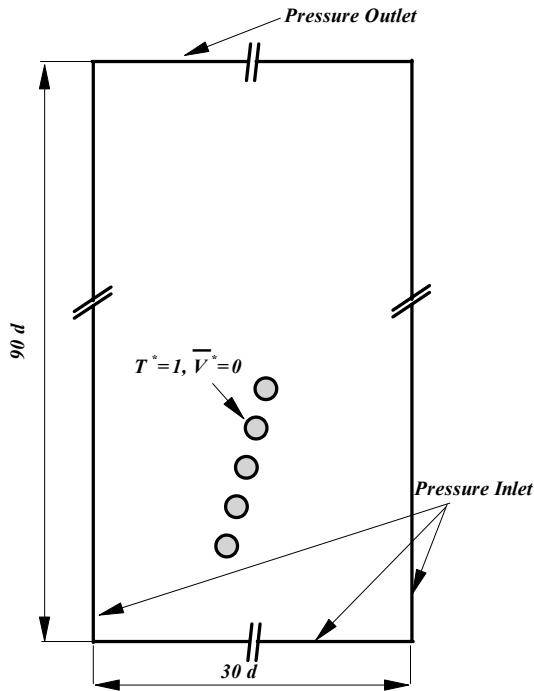
$$\bar{Nu}_o = \frac{1}{2\pi} \int_0^{2\pi} Nu_\theta \cdot d\theta$$

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ASME

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$$T^* \quad v/d \quad V^* \quad U^*$$

$$P^* = \frac{(T_w - T_\infty)}{\rho_\infty v^2 / d^2}$$

( )

$$Pr = \nu/\alpha \quad Ra = g\beta(T_w - T_\infty)d^3/\nu\alpha$$

( ) ×  $S_y/H$

$$\frac{\overline{Nu}_{iv}}{\overline{Nu}_o} = \frac{\overline{Nu}_{iv}}{\overline{Nu}_o} \quad \overline{V}^* = 0 \quad T^* = 1$$

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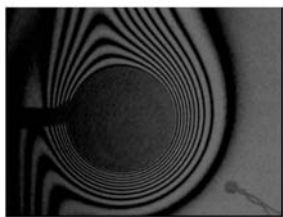
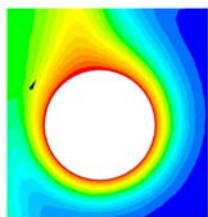
(( ) ) (( ) )

)  $P_y/d=4$   $P_y/d=3$

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$P_x/d=0$   $P_x/d=1$   $P_y/d=2$

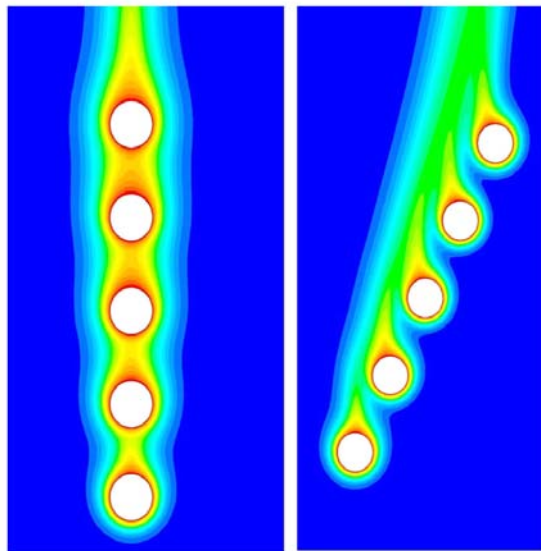
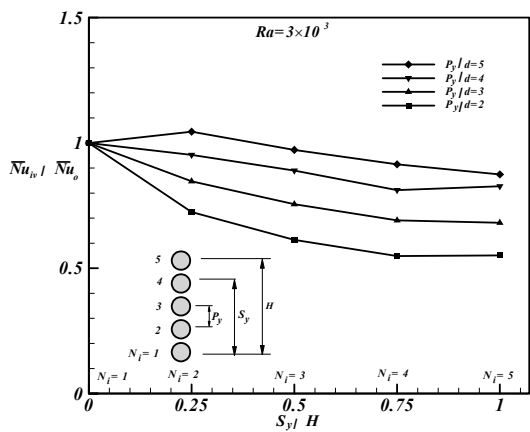
( ) ( ) ×



(ب)

(الف)

( ) ( )  $P_x/d=1$   $P_y/d=2$



(ب)

(الف)

$P_y/d=4$   $P_y/d=3$

( ) ×

$P_x/d=0$  ( )  $P_x/d=1$  ( )  $P_y/d=2$

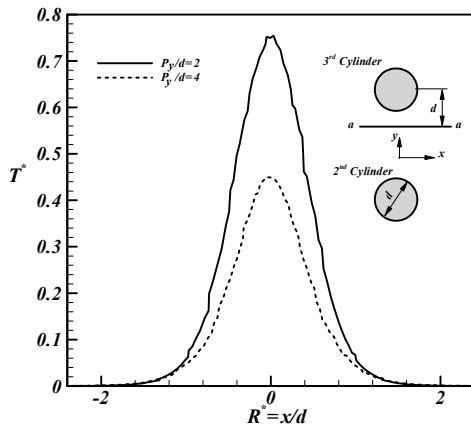
$$0 < P_x/d < 1$$

$$P_x/d > 1$$

$$P_x/d > 1$$

i

(i+)

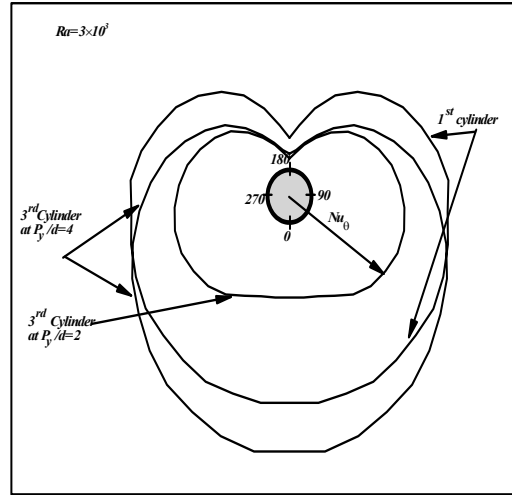


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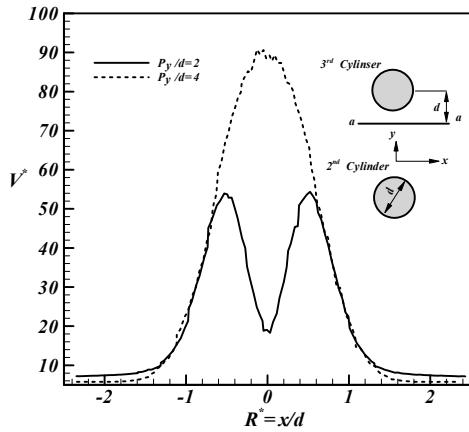
$$\theta = 0$$

$$P_y/d = 4$$

$$P_y/d = 2$$



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a-a

(( ) )

$$P_x/d$$

)

$$(P_x/d = 0)$$

$$P_x/d$$

( )

( )

( )

$$P_y/d = 2$$

$$P_y/d = 4$$

$$P_y/d = 2$$

d

a-a

×

$$S_y/H$$

( )

$$P_y/d = 2$$

$$\overline{Nu}_{ii} / \overline{Nu}_o$$

$$\overline{Nu}_{ii}$$

$$\overline{Nu}_o$$

i

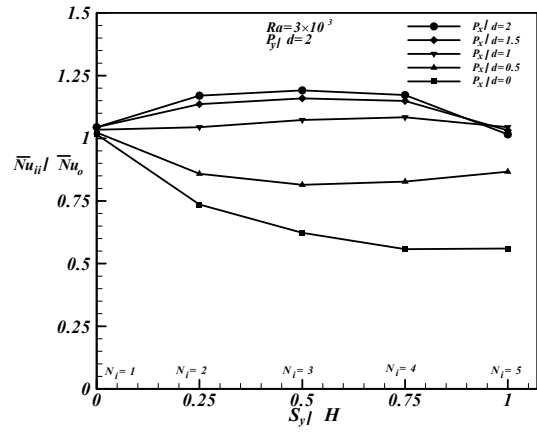
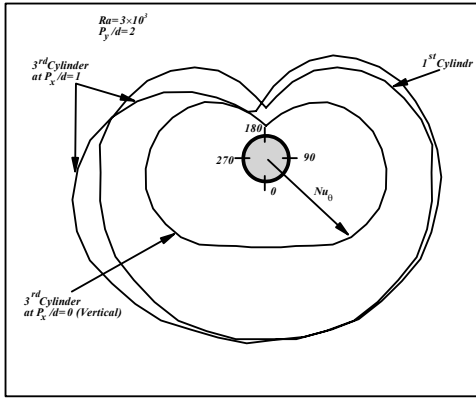
$$P_y/d = 2$$

(( ) )

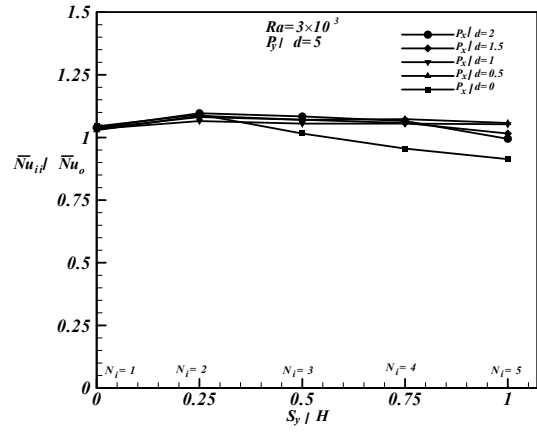
$$P_x/d=1 \quad P_x/d=0$$

$$P_y/d=2$$

$$P_x/d=1$$



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$$P_y/d=5 \quad ( ) \quad P_y/d=2 \quad ( )$$

$$(m) : d$$

$$(m/s^2) : g$$

$$(m) : H$$

$$(W/m^2K) : h_0$$

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i	:S <sub>y</sub>	(W/m K)	:k
	(m)	(N= )	:N
	(K)		i :N <sub>i</sub>
	:T <sup>*</sup> = $\frac{T - T_{\infty}}{T_w - T_{\infty}}$	i	: $\overline{Nu}_{ii}$
	(m/s) x	i	: $\overline{Nu}_{iv}$
	(m/s) y		: $\overline{Nu}_o$
	:u		:Nu <sub>θ</sub>
	:v		
x	:U <sup>*</sup> = $\frac{u}{v/d}$	(m)	:P <sub>x</sub>
		(m)	:P <sub>y</sub>
y	:V <sup>*</sup> = $\frac{v}{v/d}$		(Pa) :p
	(m <sup>2</sup> /s)		:Pr
	(1/K)		:P <sup>*</sup> = $\frac{p}{\rho_{\infty} v^2 / d^2}$
	(m <sup>2</sup> /s)		:Ra = $g\beta(T_w - T_{\infty})d^3 / \nu\alpha$
(Degree)	:θ		
	:f		
	:w	(m)	:r
	:∞	i	:S <sub>x</sub>
			(m)

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