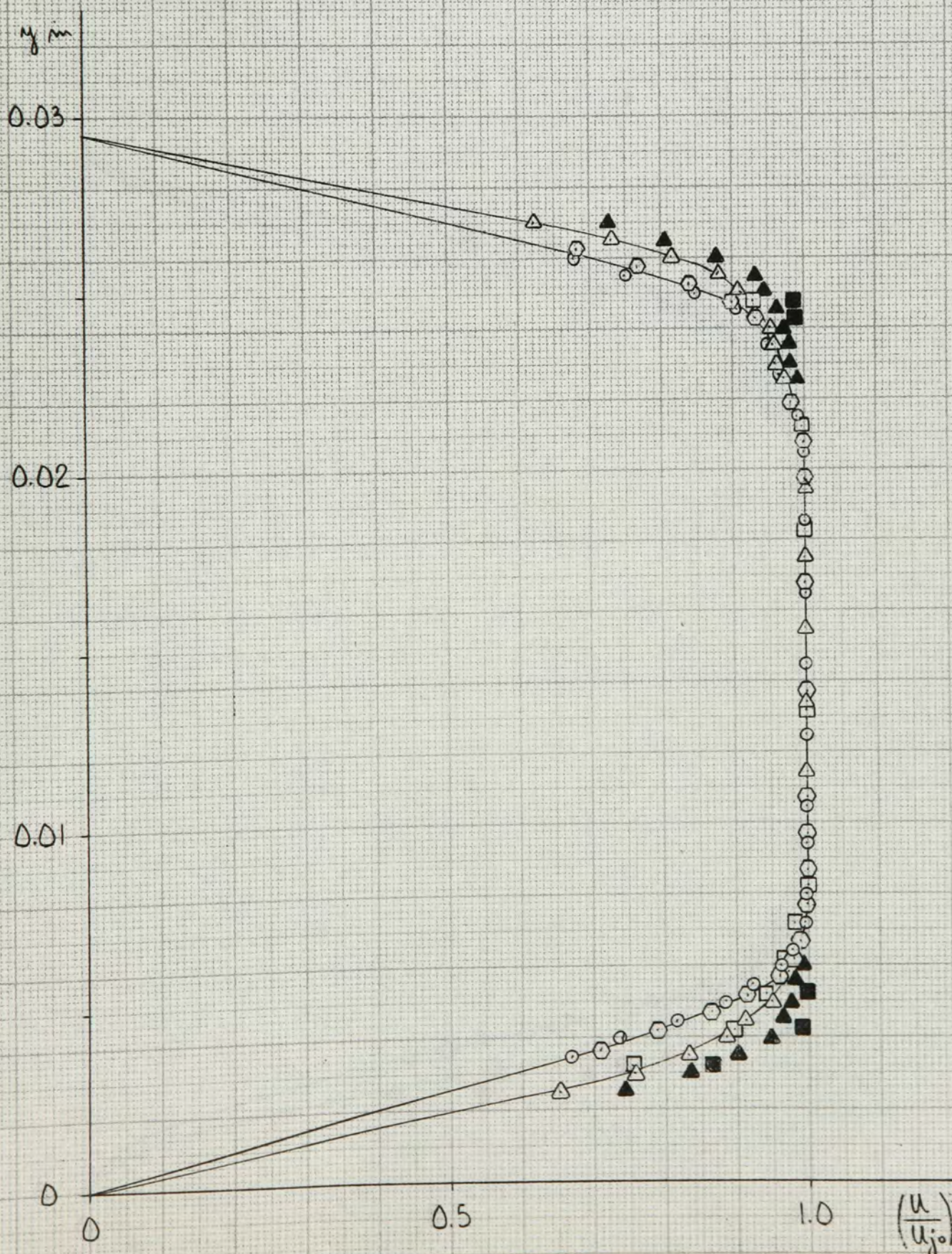


NON-DIMENSIONAL SLOT-VELOCITY PROFILES - IMPROVED CYLINDER

FIG. 22

	$\frac{b}{a}$	Re	Probe
○	0.0074	3.98×10^4	0.007 in. High Flat Pitot
⊙	"	3.94×10^4	" " "
▲	"	3.98×10^4	H.W. N7 No Wall Corr.
△	"	"	Wall Corr.
□	"	3.68×10^4	H.W. N2 Wall Corr. (14)
■	"	"	No Wall Corr.



NON-DIMENSIONAL SLOT-VELOCITY PROFILES SQUARED -
IMPROVED CYLINDER

FIG. 23

	$\frac{b}{a}$	Re	K	Probe
○	0.0074	3.98×10^4	0.748	0.007 in. High Flat Pitot
⊙	"	3.94×10^4		" " "
▲	"	3.98×10^4	0.786	No Wall Corr.
△				H.W. N7 Wall Corr. (14)
□	"	3.68×10^4		H.W. N2
■	"			No Wall Corr.

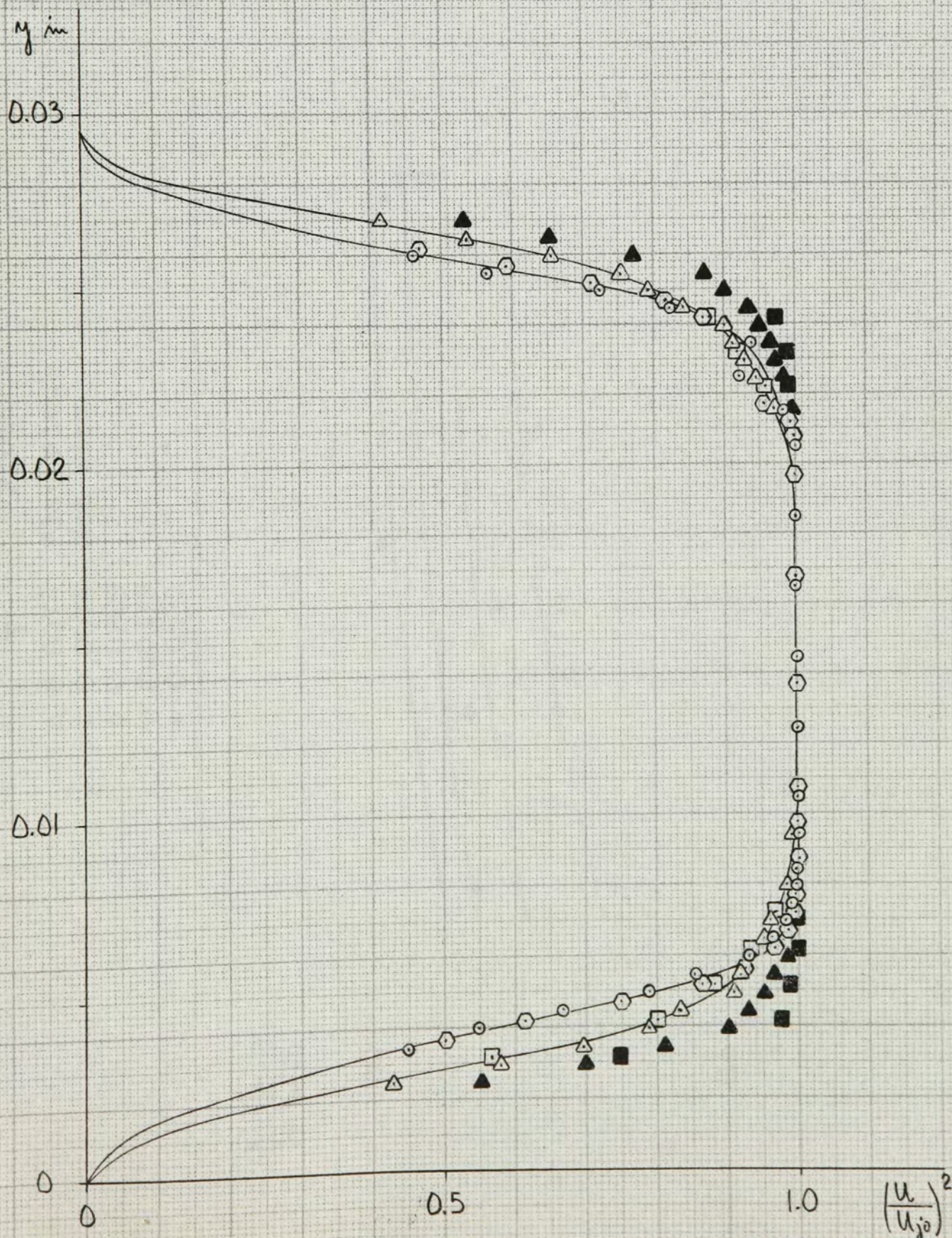
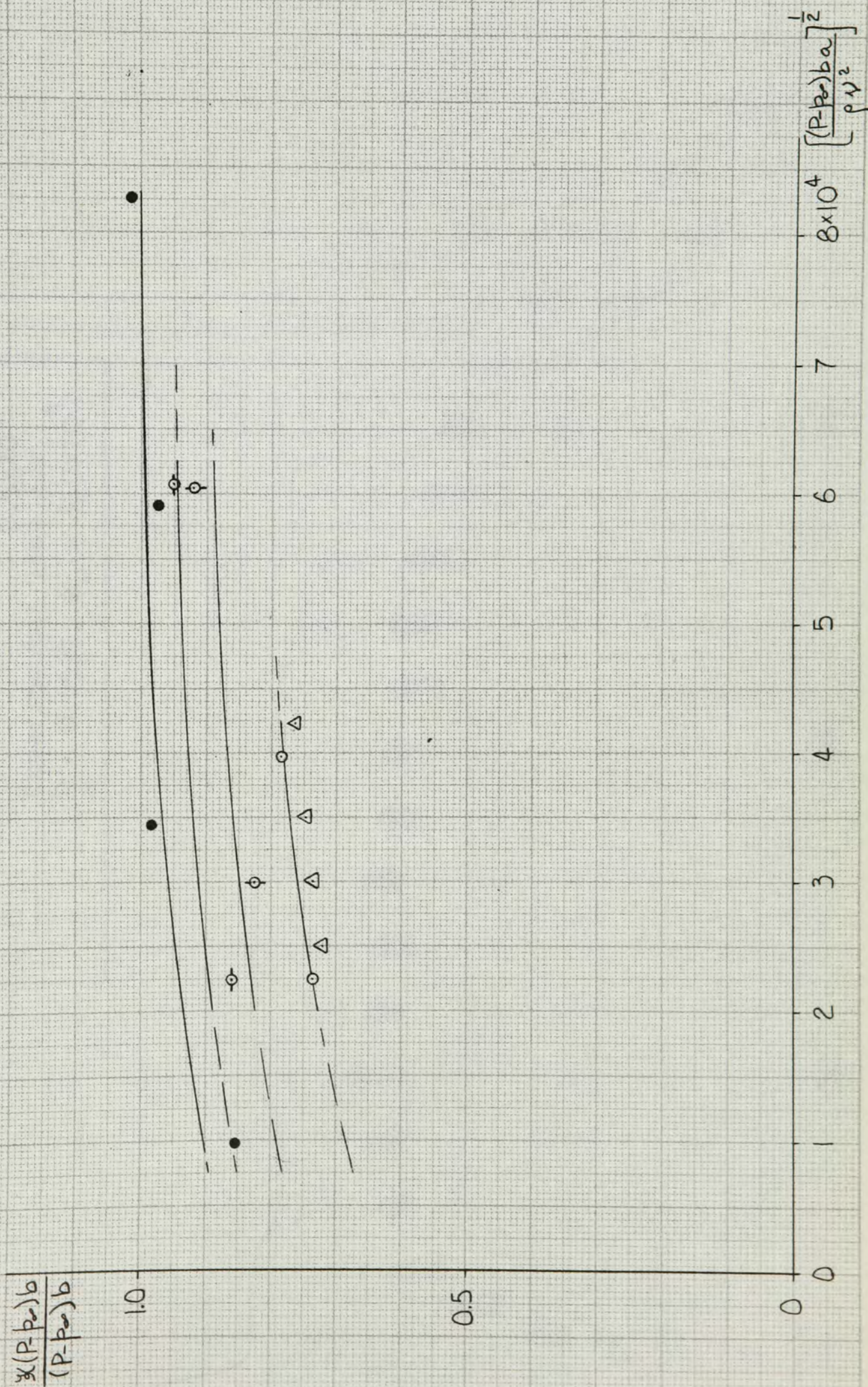
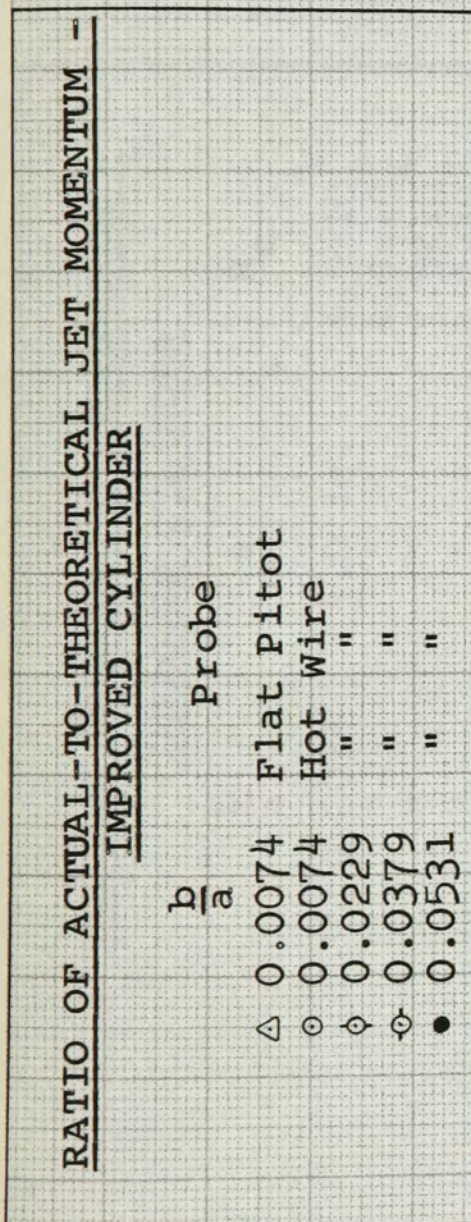


FIG. 24



SURFACE PRESSURE DISTRIBUTION -
IMPROVED CYLINDER

	$\frac{b}{a}$	a	R_e
▽	0.0074	4.0 in.	4.5×10^4
△	"	"	4.0×10^4
◇	"	"	3.5×10^4
◊	"	"	3.0×10^4
□	"	"	2.5×10^4

Experimental line for
 $\frac{b}{a} = 0.0531, R_e = 4.0 \times 10^4$

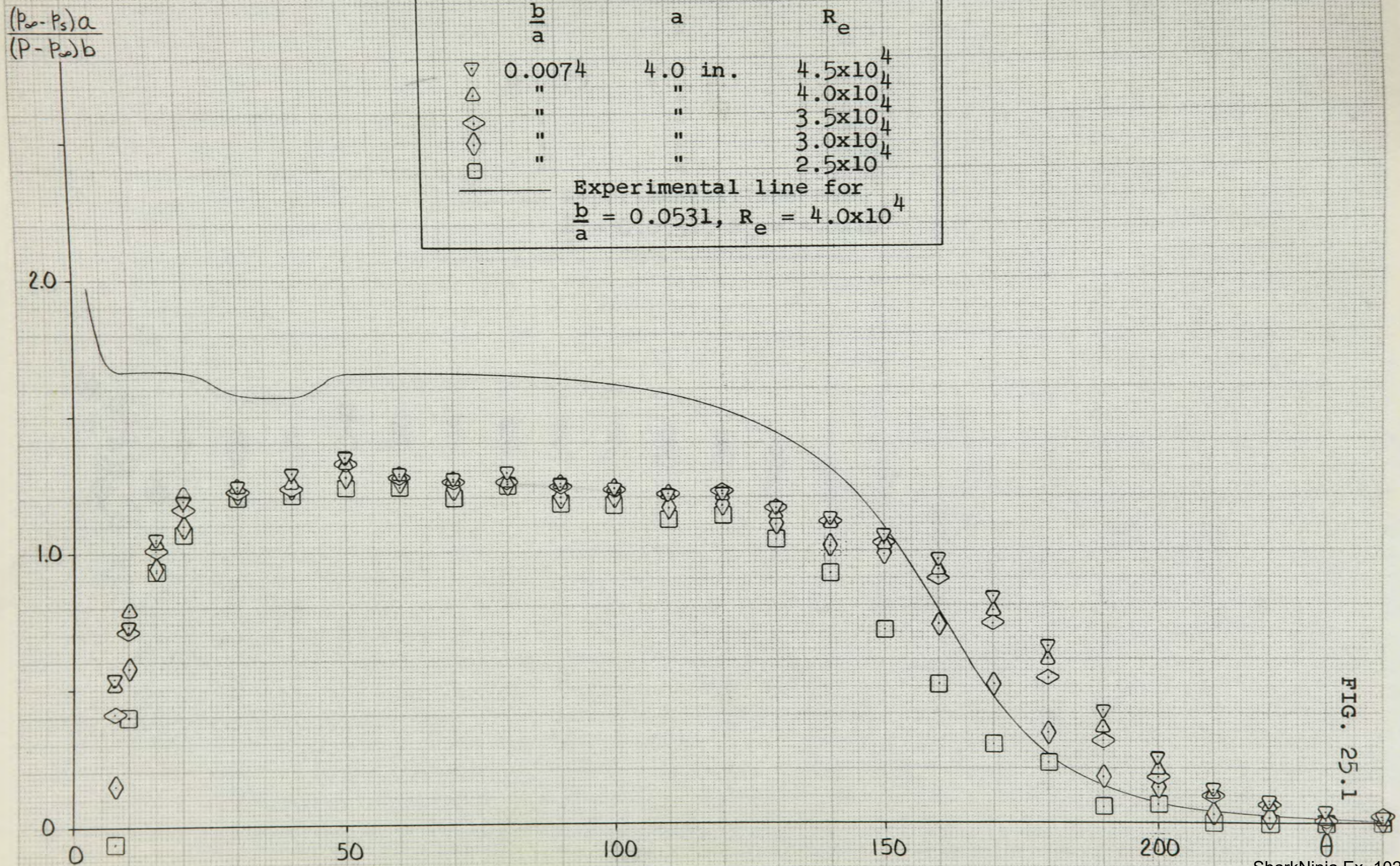


FIG. 25.1

SURFACE PRESSURE DISTRIBUTION -

IMPROVED CYLINDER

$\frac{b}{a}$	a	R_e
0.0229	4.0 in.	6.0×10^4
"	"	4.5×10^4
"	"	4.0×10^4
"	"	3.0×10^4
"	"	2.0×10^4

Experimental line for $\frac{b}{a} = 0.0531, R_e = 4.0 \times 10^4$

$$\frac{(p_0 - p_s)a}{(p - p_\infty)b}$$

2.0

1.0

0

50

100

150

200

FIG. 25.2

SURFACE PRESSURE DISTRIBUTION -
IMPROVED CYLINDER

$\frac{b}{a}$	a	R_e
0.0379	4.0 in.	8.0×10^4
"	"	6.0×10^4
"	"	4.0×10^4
"	"	3.0×10^4
"	"	2.0×10^4

Experimental line for $\frac{b}{a} = 0.0531, R_e = 4.0 \times 10^4$

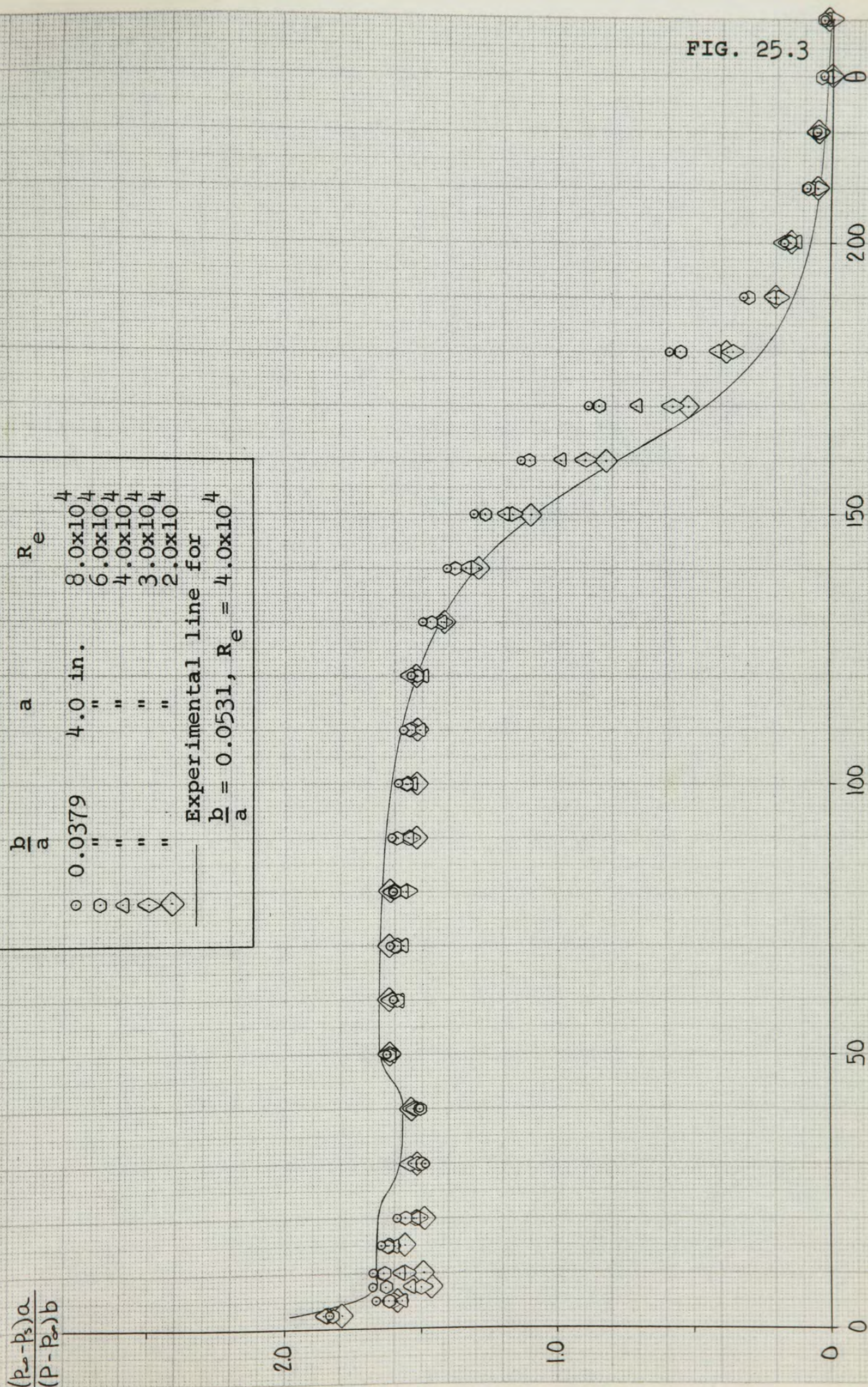


FIG. 25.3

SURFACE PRESSURE DISTRIBUTION -
IMPROVED CYLINDER

	$\frac{b}{a}$	a	Re
○	0.0531	4.0 in.	8.0×10^4
◊	"	"	6.0×10^4
△	"	"	4.0×10^4
◇	"	"	3.0×10^4
◆	"	"	2.0×10^4

— Experimental line for
 $\frac{b}{a} = 0.0531, Re = 4.0 \times 10^4$

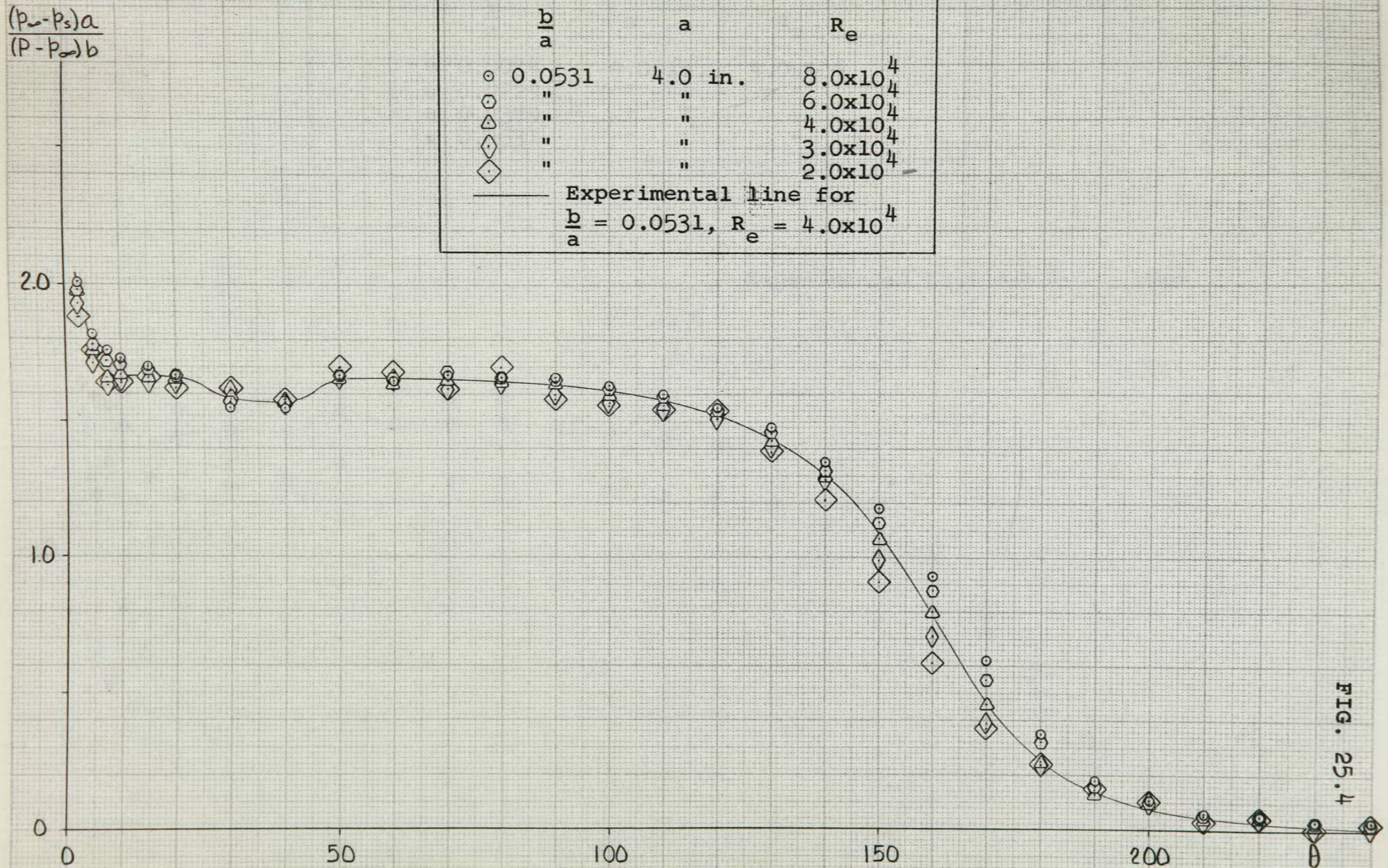


FIG. 25.4

SURFACE PRESSURE DISTRIBUTION AT HIGH R_e -
IMPROVED CYLINDER

$\frac{b}{a}$	a	R_e
○ 0.0074	4.0 in.	4.0×10^4
◊ 0.0229	"	"
◐ 0.0379	"	"
● 0.0531	"	"

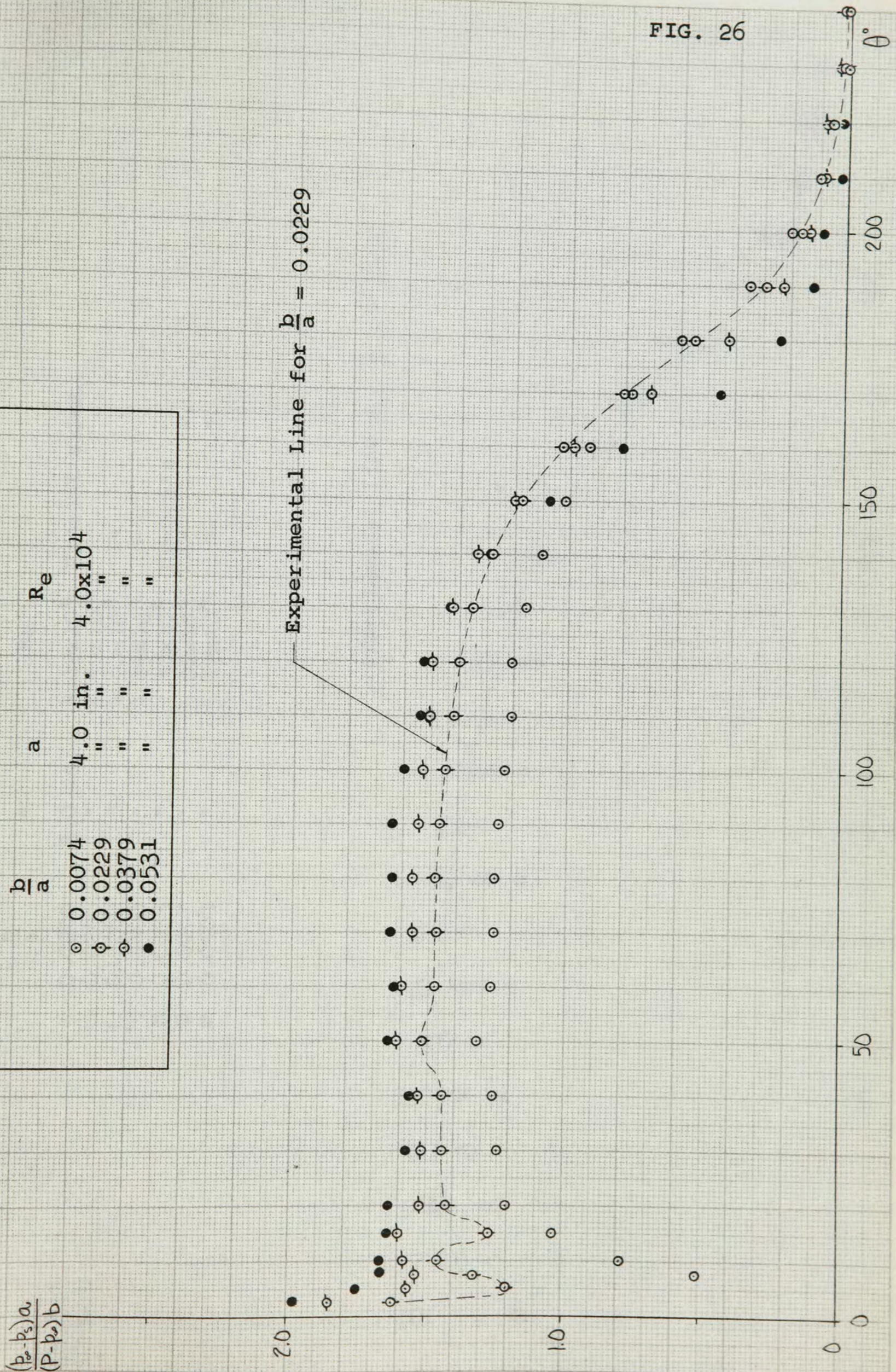


FIG. 26

SURFACE PRESSURE DISTRIBUTION AT HIGH Re -
NEWMAN'S CYLINDER

	$\frac{b}{a}$	a	Re		
$\diamond$	0.0200	3.0 in.	4.19×10^4	Present	Expmt.
$\diamond$	0.0265	"	4.39×10^4	"	"
$\square$	0.0282	"	4.20×10^4	"	"
∇	0.0400	"	4.45×10^4	"	"
$\otimes$	0.0133	"	3.48×10^4	Newman's	"
$\oplus$	0.0267	"	5.02×10^4	"	"
$\odot$	0.0400	"	5.12×10^4	"	"

$$\frac{(p_w - p_s)a}{(P - p_w)b}$$

2.0

Experimental line for $\frac{b}{a} = 0.0265$

1.0

0

50

100

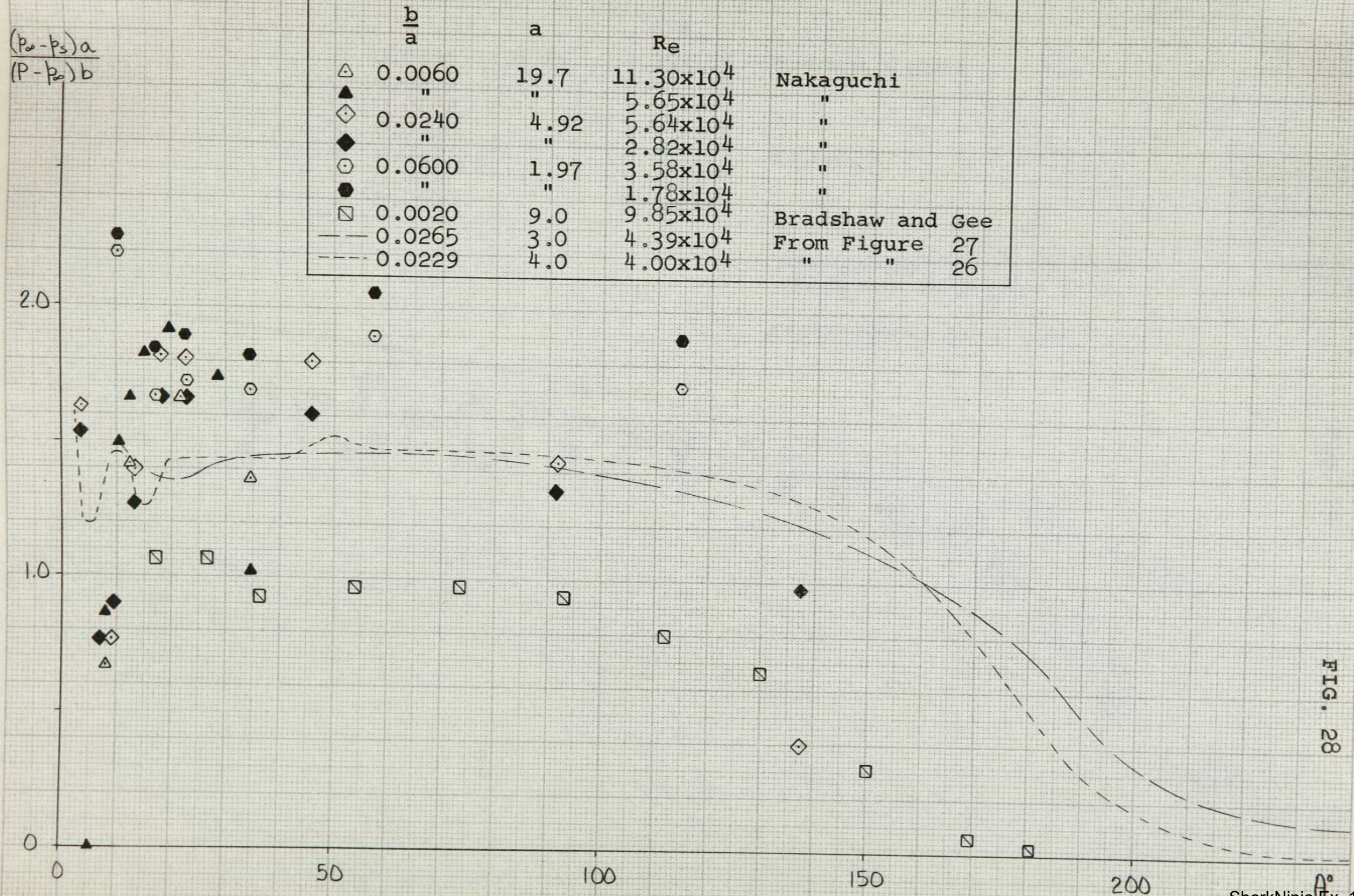
150

200

FIG. 27

θ°

COMPARISON OF SURFACE PRESSURE DISTRIBUTIONS - CIRCULAR CYLINDERS



SURFACE PRESSURE COEFFICIENT FOR UNIVERSAL FLOW -
NEWMAN'S CYLINDER

	$\frac{b}{a}$	a	Re		
◇	0.0200	3.0 in.	4.19×10^4	Present	Expmt.
◇	0.0265	"	4.34×10^4	"	"
□	0.0282	"	4.20×10^4	"	"
▽	0.0400	"	4.45×10^4	"	"
⊗	0.0133	"	3.48×10^4	Newman's	"
⊕	0.0267	"	5.02×10^4	"	"
●	0.0400	"	5.12×10^4	"	"

$$\frac{(p_o - p_s)a}{\mu(P - p_o)b}$$

2.0

Theory-Equation (4.6) with
Constants of Figure (15)

Experimental Mean Line

1.0

FIG. 29

0

0

50

100

150

200

**SURFACE PRESSURE COEFFICIENT FOR UNIVERSAL FLOW -
IMPROVED CYLINDER**

$\frac{b}{a}$	a	Re
○ 0.0074	4.0 in.	4.0×10^4
◊ 0.0229	"	"
◊ 0.0379	"	"
● 0.0531	"	"

$$\frac{(p_0 - p_s)a}{\rho(P - p_\infty)b}$$

Theory - Equation (4.6) with
Constants of Figure (16)

Experimental Mean Line

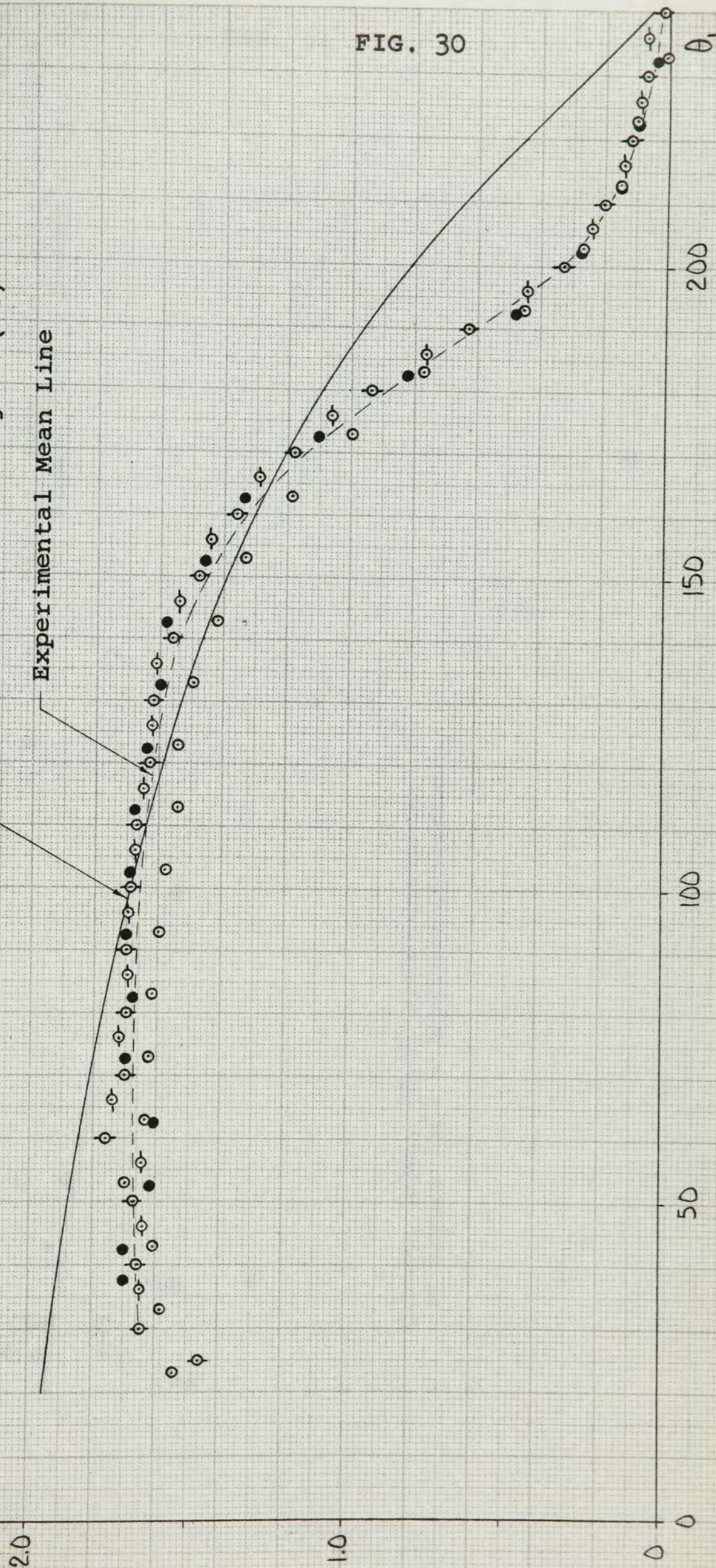


FIG. 30

COMPARISON OF SURFACE PRESSURE COEFFICIENTS FOR UNIVERSAL FLOW - CIRCULAR CYLINDERS

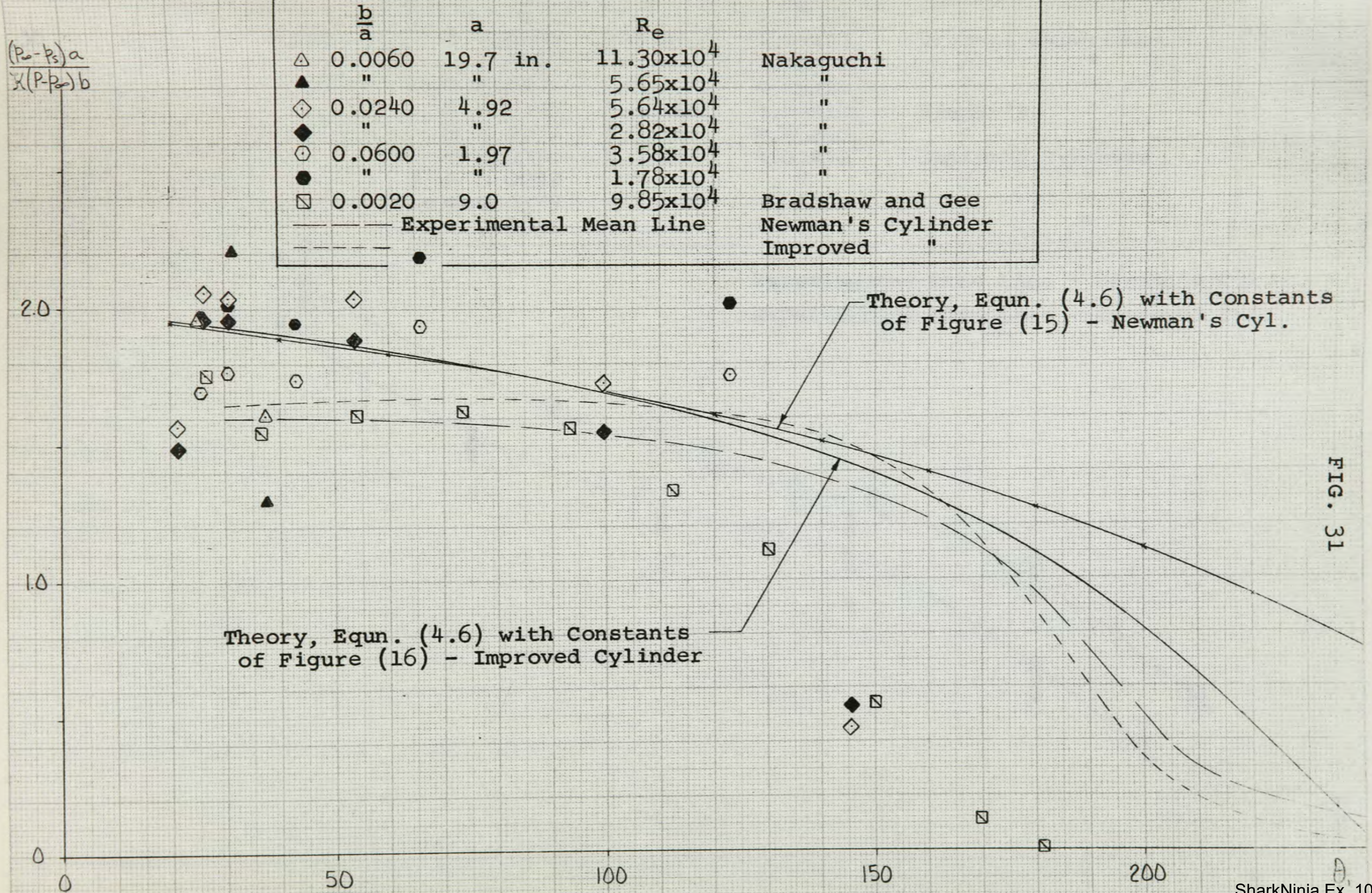


FIG. 31

$$\frac{\rho u^2 a \theta}{(P - P_\infty) b}$$

MAXIMUM VELOCITY DECAY - NEWMAN'S AND IMPROVED CYLINDERS

	$\frac{b}{a}$	a	Re		
◇	0.0200	3.0 in.	4.19×10^4	Present Experiment	
◇	0.0265	"	4.39×10^4	"	"
▽	0.0400	"	4.45×10^4	"	"
⊗	0.0282	2.55 in.	4.60×10^4	Newman's	"
⊕	0.0267	3.0 in.	4.85×10^4	"	"
○	0.0074	4.0 in.	4.00×10^4	Improved Cylinder	
◇	0.0229	"	"	"	"
●	0.0379	"	"	"	"
●	0.0531	"	"	"	"

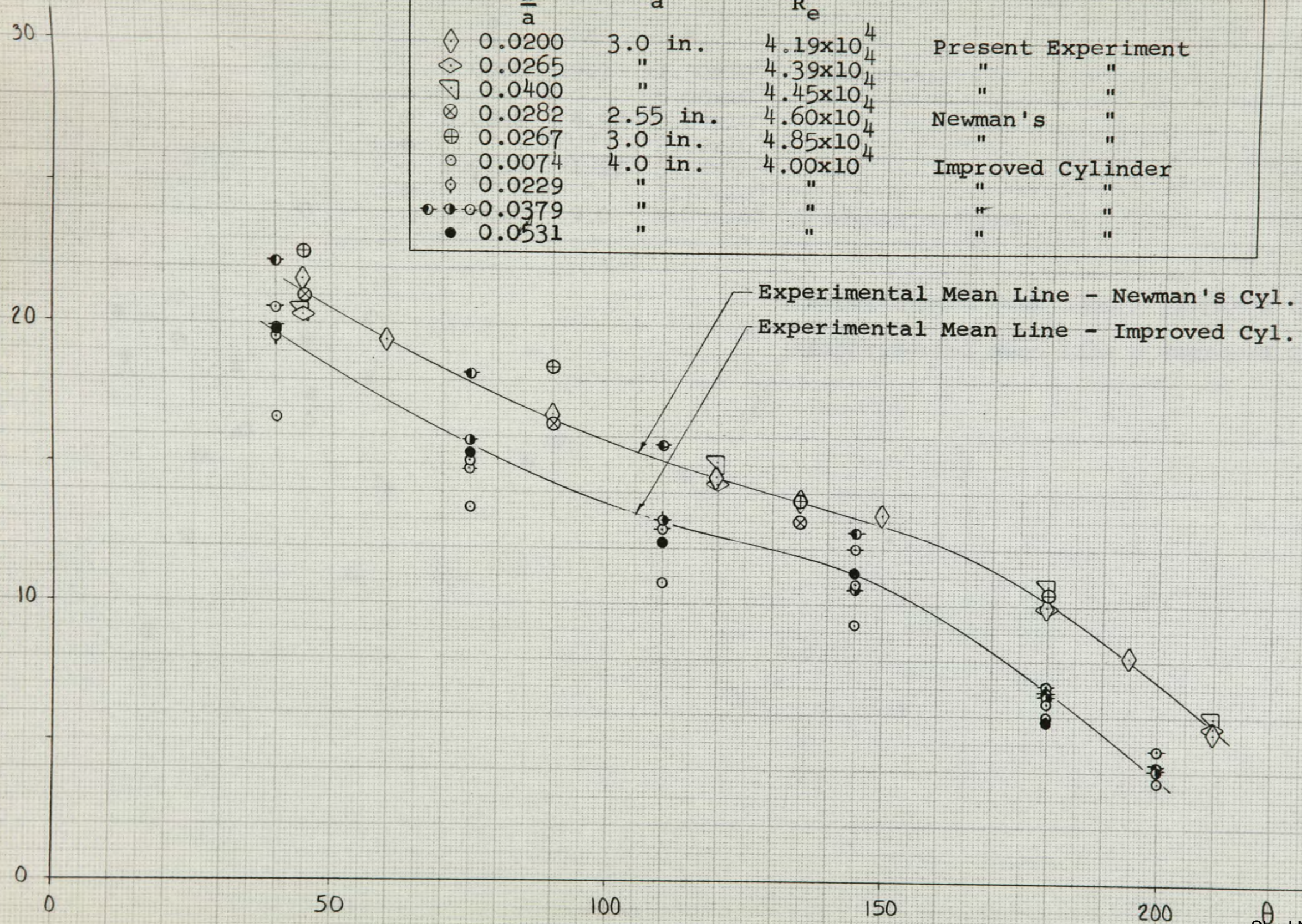


FIG. 32

$$\frac{\rho u^2 a \theta}{(P-p_\infty)b}$$

COMPARISON OF MAXIMUM VELOCITIES, CIRCULAR CYLINDERS

	$\frac{b}{a}$	a	Re	
$\triangle$	0.0060	19.7	11.30×10^4	Nakaguchi
$\blacktriangle$	"	"	5.65×10^4	"
$\diamond$	0.0240	4.92	5.64×10^4	"
$\blacklozenge$	"	"	2.82×10^4	"
$\circ$	0.0600	1.97	3.58×10^4	"
$\bullet$	"	"	1.78×10^4	"
$\square$	0.0020	9.0	9.85×10^4	Bradshaw and Gee

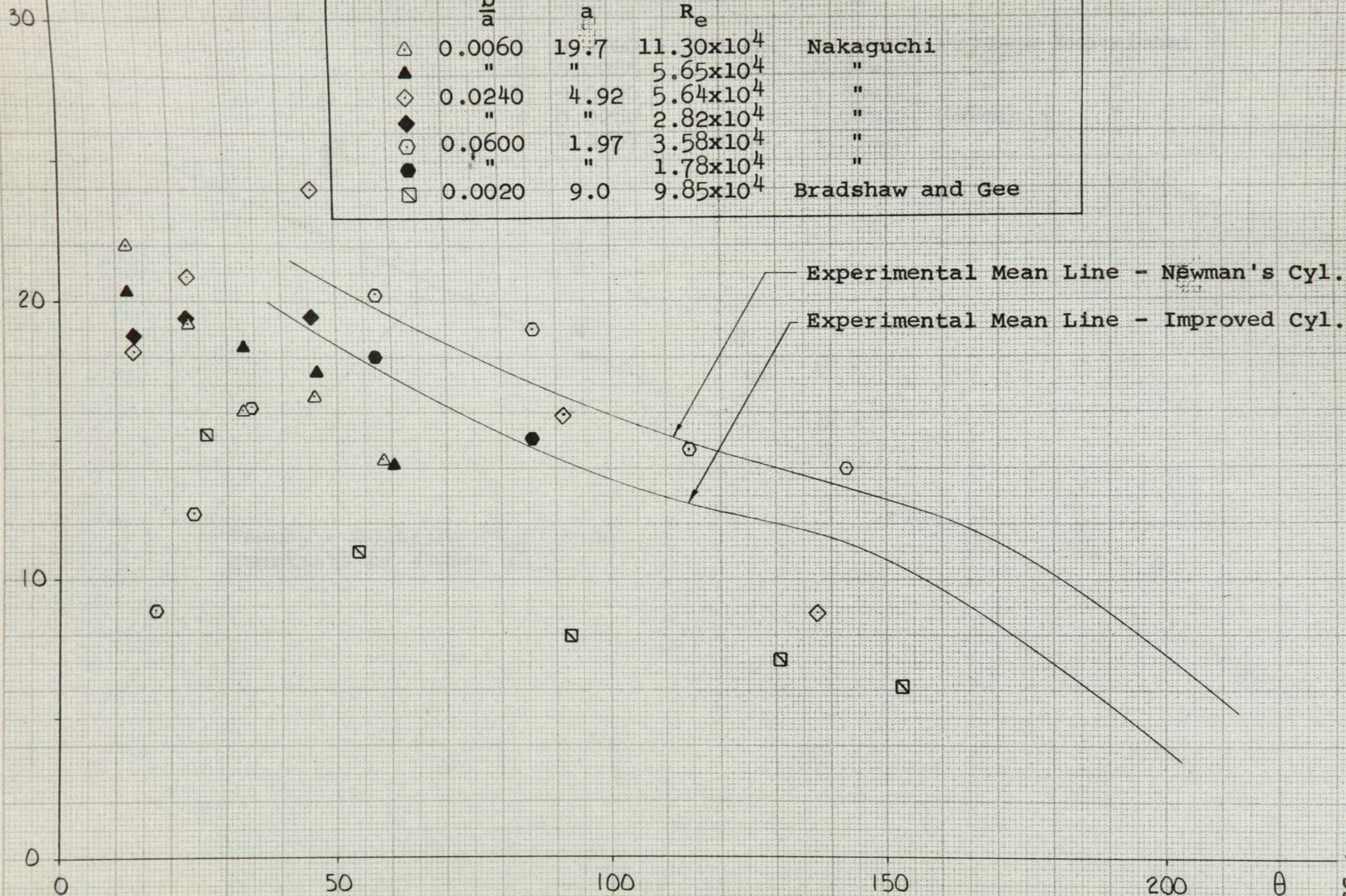


FIG. 33

$$\frac{\rho u_m^2 a \theta_i}{X(P-p_\infty)b}$$

MAXIMUM VELOCITY COEFFICIENT FOR UNIVERSAL FLOW -

NEWMAN'S CYLINDER

	$\frac{b}{a}$	a	R_e		
◇	0.0200	3.0 in.	4.19×10^4	Present Experiment	
◇	0.0265	"	4.39×10^4	"	"
▽	0.0400	"	4.45×10^4	"	"
⊗	0.0282	2.55 in.	4.60×10^4	Newman's	"
⊕	0.0267	3.0 in.	4.85×10^4	"	"

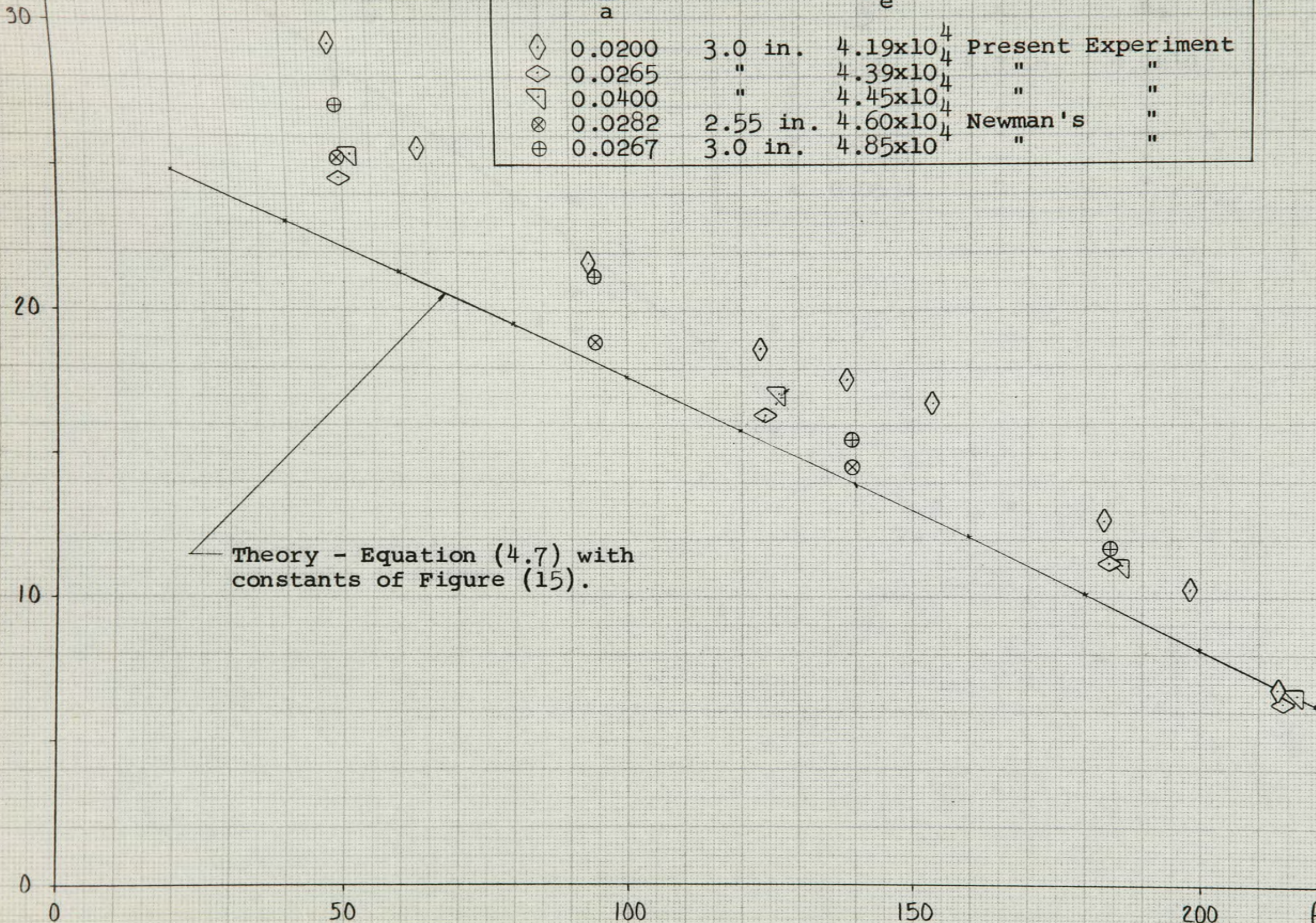


FIG. 34

$$\frac{\rho u_m^2 a \theta_i}{\chi(P-p_0)b}$$

MAXIMUM VELOCITY COEFFICIENT FOR UNIVERSAL FLOW - IMPROVED CYLINDER

	$\frac{b}{a}$	a	Re
○	0.0074	4.0 in.	4.0×10^4
○	0.0229	"	"
○	0.0379	"	"
●	0.0379	"	"
●	0.0379	"	"
●	0.0531	"	"

Theory - Equation (4.7) with
constants of Figure (16).

FIG. 35

$$\frac{\rho u_m^2 a \theta_1}{\pi(P-p_\infty)b}$$

COMPARISON OF MAXIMUM VELOCITY COEFFICIENTS FOR UNIVERSAL FLOW - CIRCULAR CYLINDERS

	$\frac{b}{a}$	a	Re	
$\triangle$	0.0060	19.7 in.	11.30×10^4	Nakaguchi
$\blacktriangle$	"	"	5.65×10^4	
$\diamond$	0.0240	4.92	5.64×10^4	
$\blacklozenge$	"	"	2.82×10^4	
$\circ$	0.0600	1.97	3.58×10^4	Bradshaw and Gee
$\bullet$	"	"	1.78×10^4	
$\square$	0.0020	9.0	9.85×10^4	

30

20

10

0

Theory, Eqn. (4.7) with
constants of Fig. (16) -
Improved Cylinder.

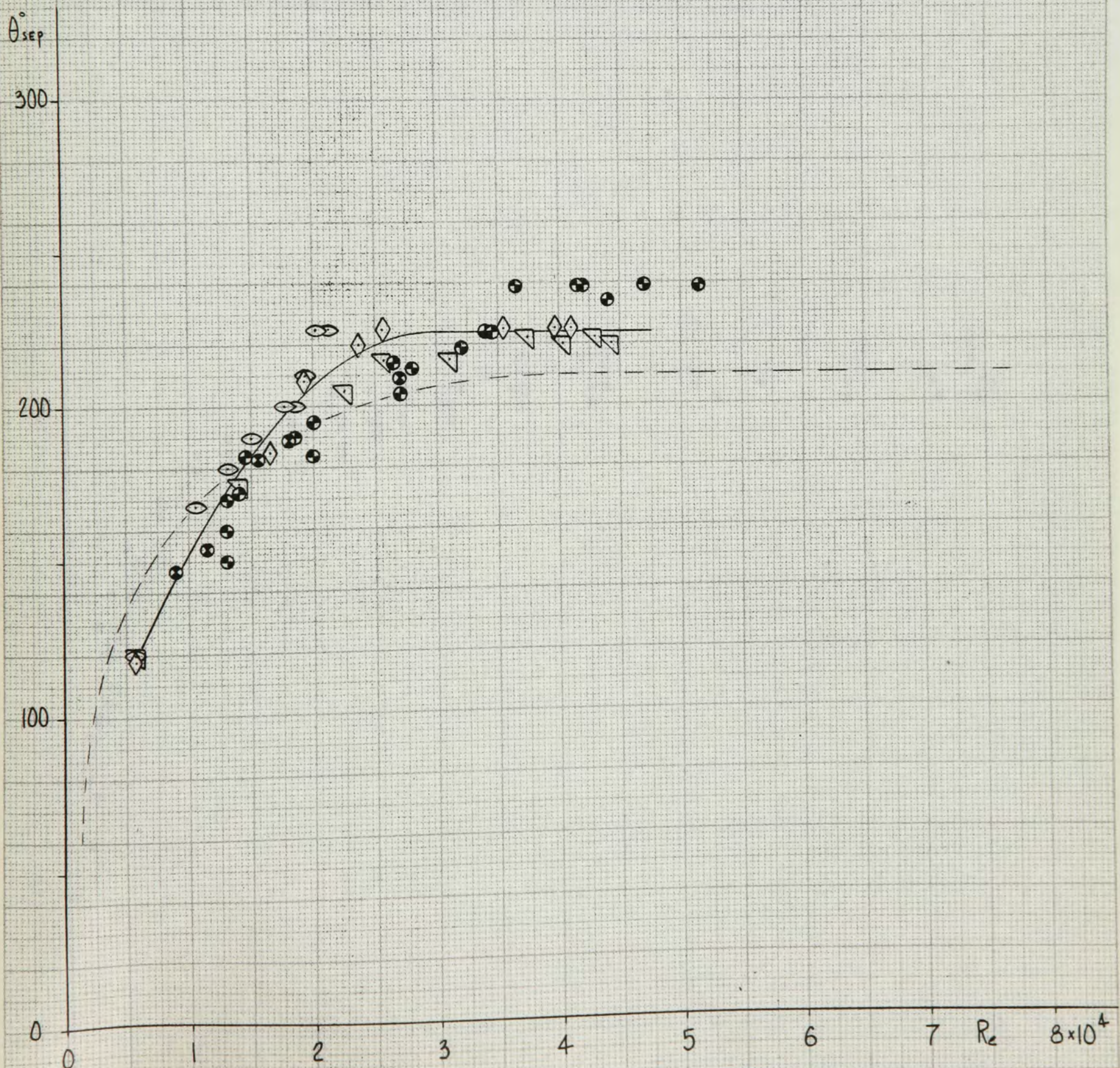
Theory, Eqn. (4.7) with
constants of Fig. (15) -
Newman's Cylinder.

FIG. 36

ANGULAR POSITION OF SEPARATION -
NEWMAN'S CYLINDER

FIG. 37

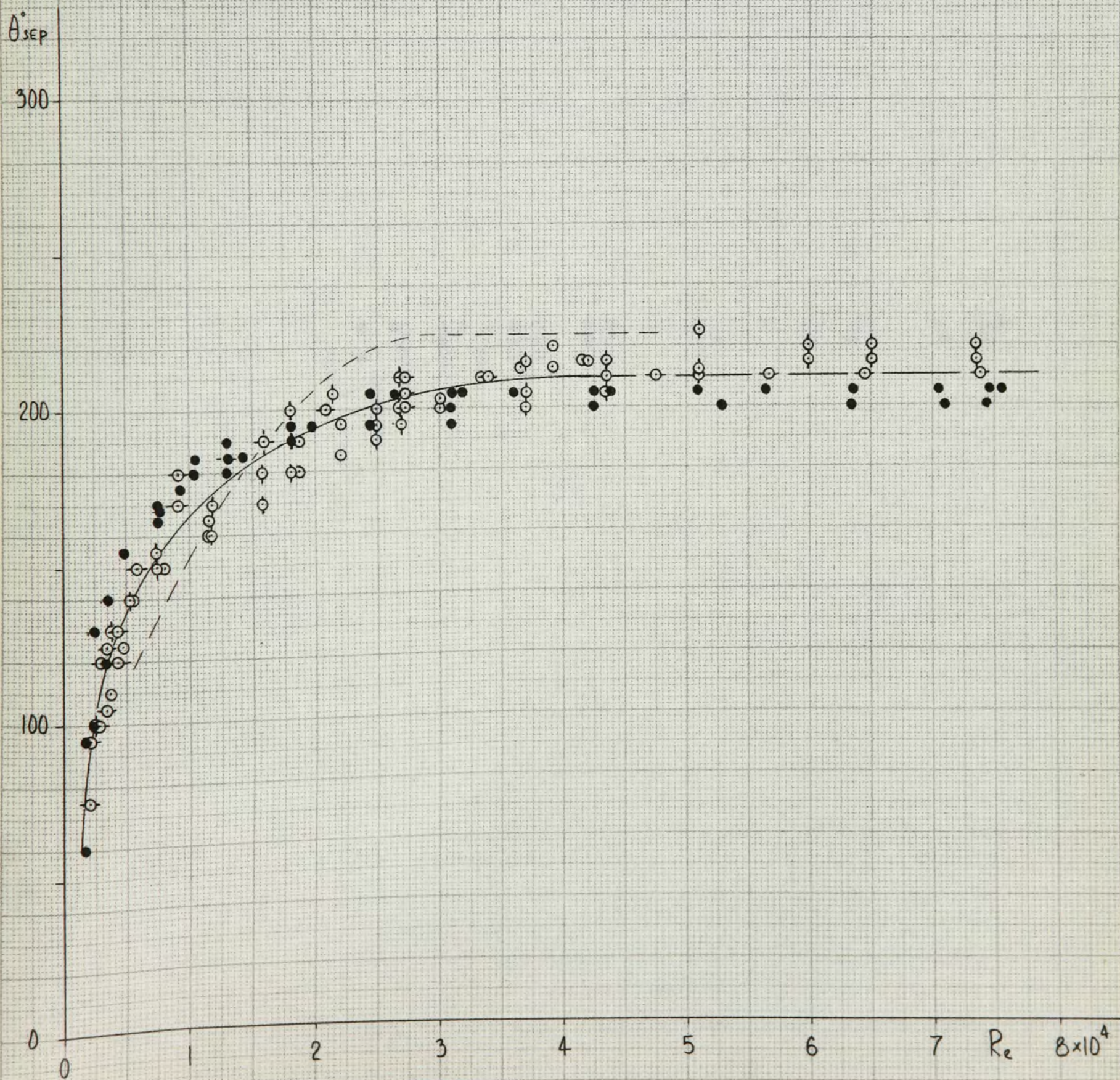
	$\frac{b}{a}$	a		
○	0.0033	3.0 in.	Present	Expmt.
◇	0.0167	"	"	"
▽	0.0367	"	"	"
⊗	0.0067	"	Newman's	"
⊕	0.0200	"	"	"
⊙	0.0400	"	"	"
—	Experimental mean line			
- - -	Improved Cylinder			



ANGULAR POSITION OF SEPARATION -
IMPROVED CYLINDER

FIG. 38

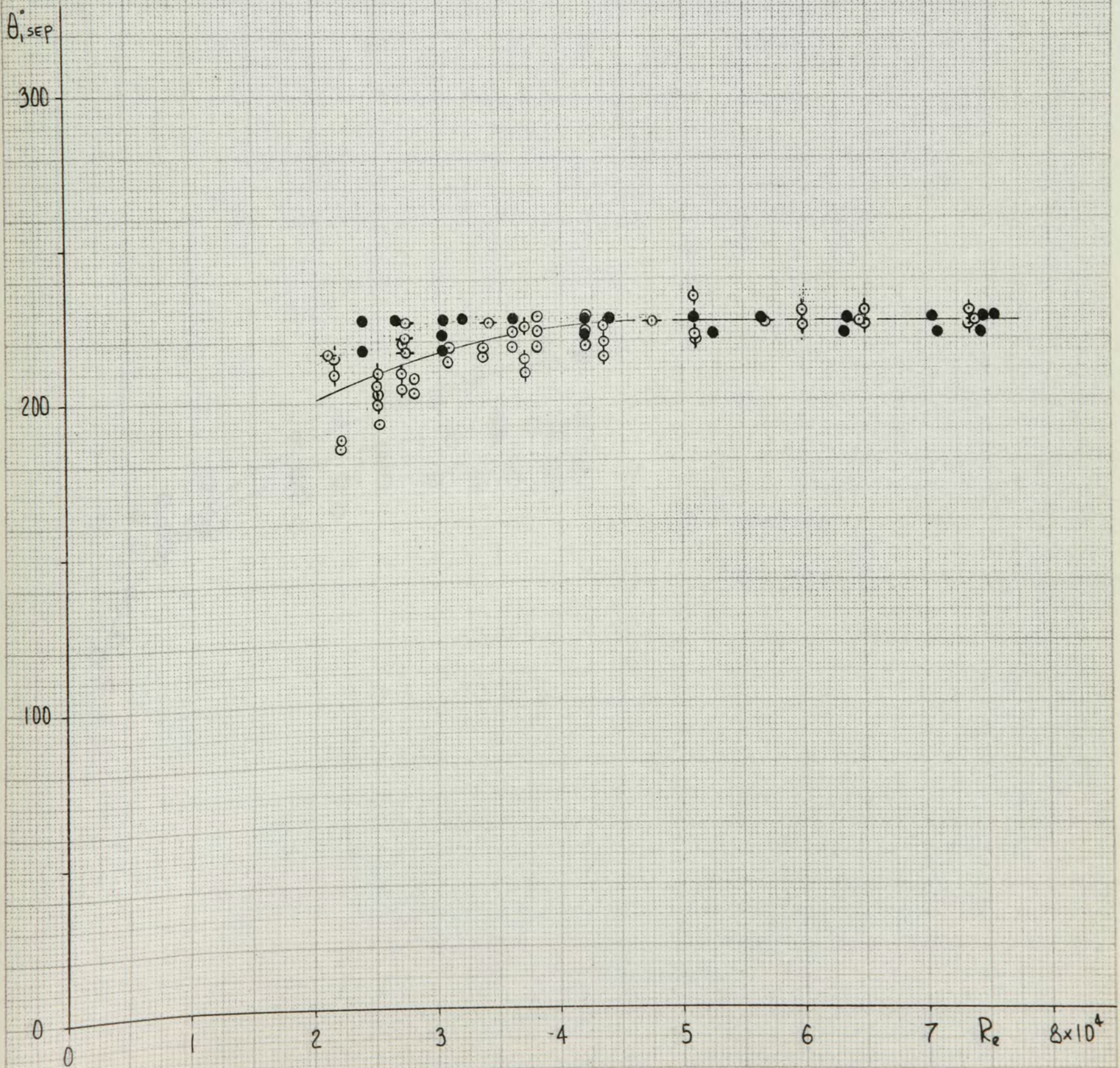
	$\frac{b}{a}$	a
○	0.0074	4.0 in.
◊	0.0229	"
◐	0.0379	"
●	0.0531	"
—	Experimental mean line	
- - -	Newman's Cyl.	



ANGULAR POSITION OF SEPARATION FOR
UNIVERSAL FLOW - IMPROVED CYLINDER

FIG. 39

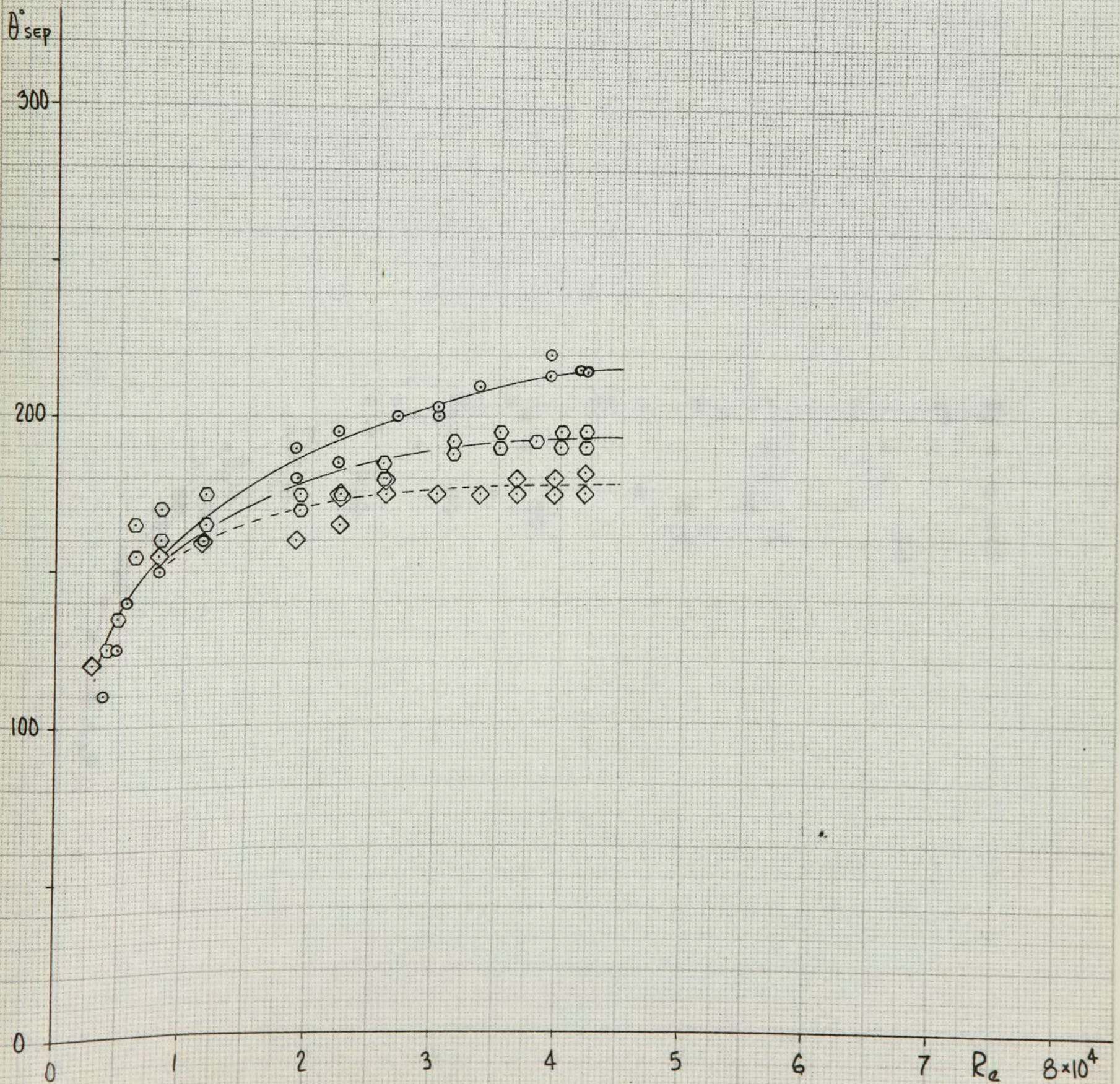
	$\frac{b}{a}$	a
○	0.0074	4.0 in.
◊	0.0229	"
◐	0.0379	"
●	0.0531	"
—	Experimental mean line	



ANGULAR POSITION OF SEPARATION -
ROUGH CYLINDER

FIG. 40

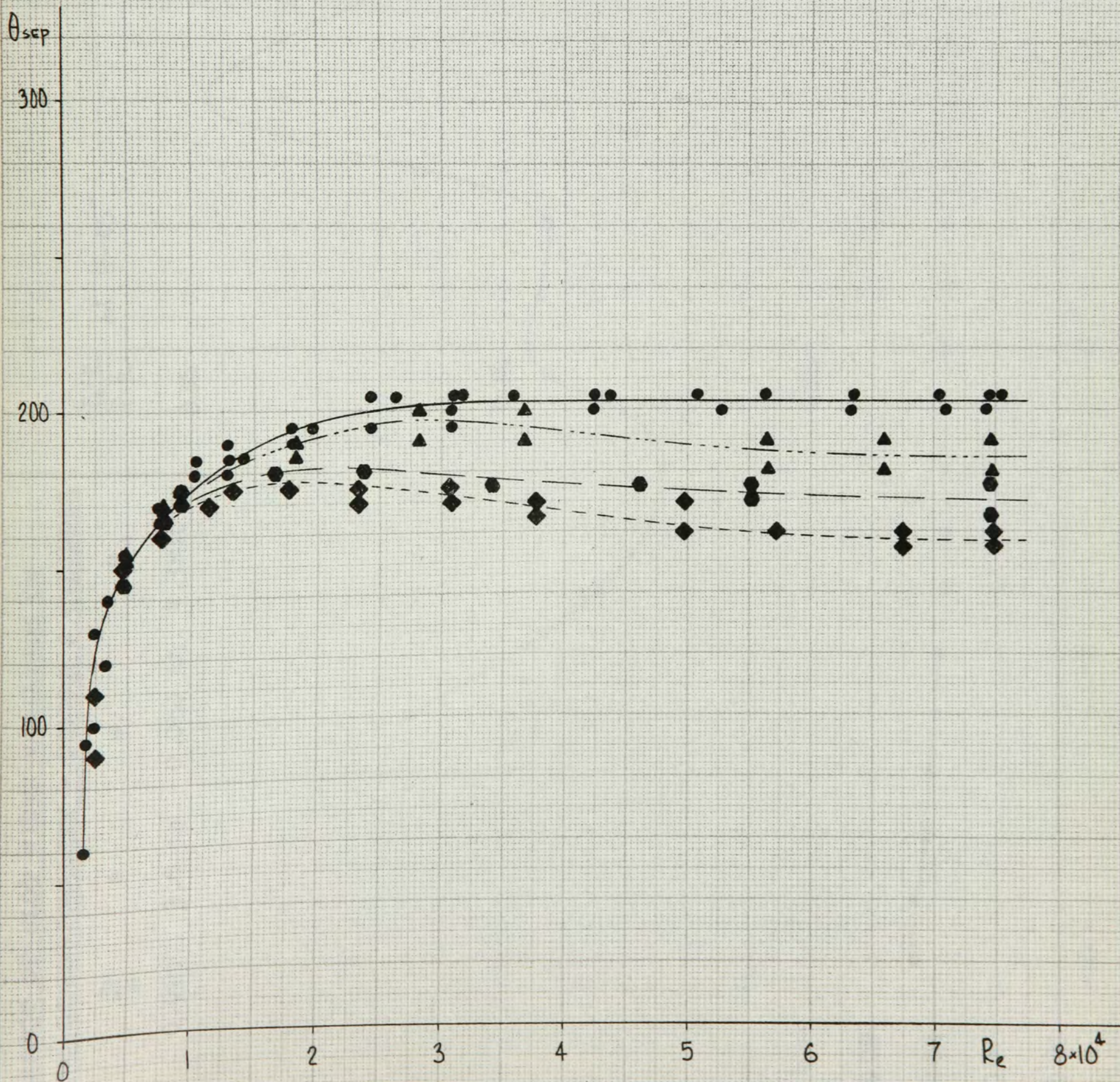
	$\frac{b}{a}$	Garnet paper	$\frac{h}{a}$
○	0.0074	none	0.0000
◊	"	60 grit size	0.0024
◇	"	36 " "	0.0045



ANGULAR POSITION OF SEPARATION -
ROUGH CYLINDER

FIG. 41

	$\frac{b}{a}$	garnet paper		$\frac{h}{a}$
•	0.0531	none		0.0000
▲	"	100	grit size	0.0014
●	"	60	" "	0.0024
◆	"	36	" "	0.0045



**EFFECT OF SLOT WIDTH VARIATION ON
TWO-DIMENSIONALITY - NEWMAN'S CYLINDER**

$\frac{b}{a}$	a	y	Re
0.0257	3.0 in.	0.050 in.	4.3×10^4

$\frac{p_t - p_\infty}{p - p_\infty}$ at $\theta = 45^\circ$

0.35

0.30

0.25

b_{in}

0.09

0.08

0.07

0.06

-10

-5

0

5

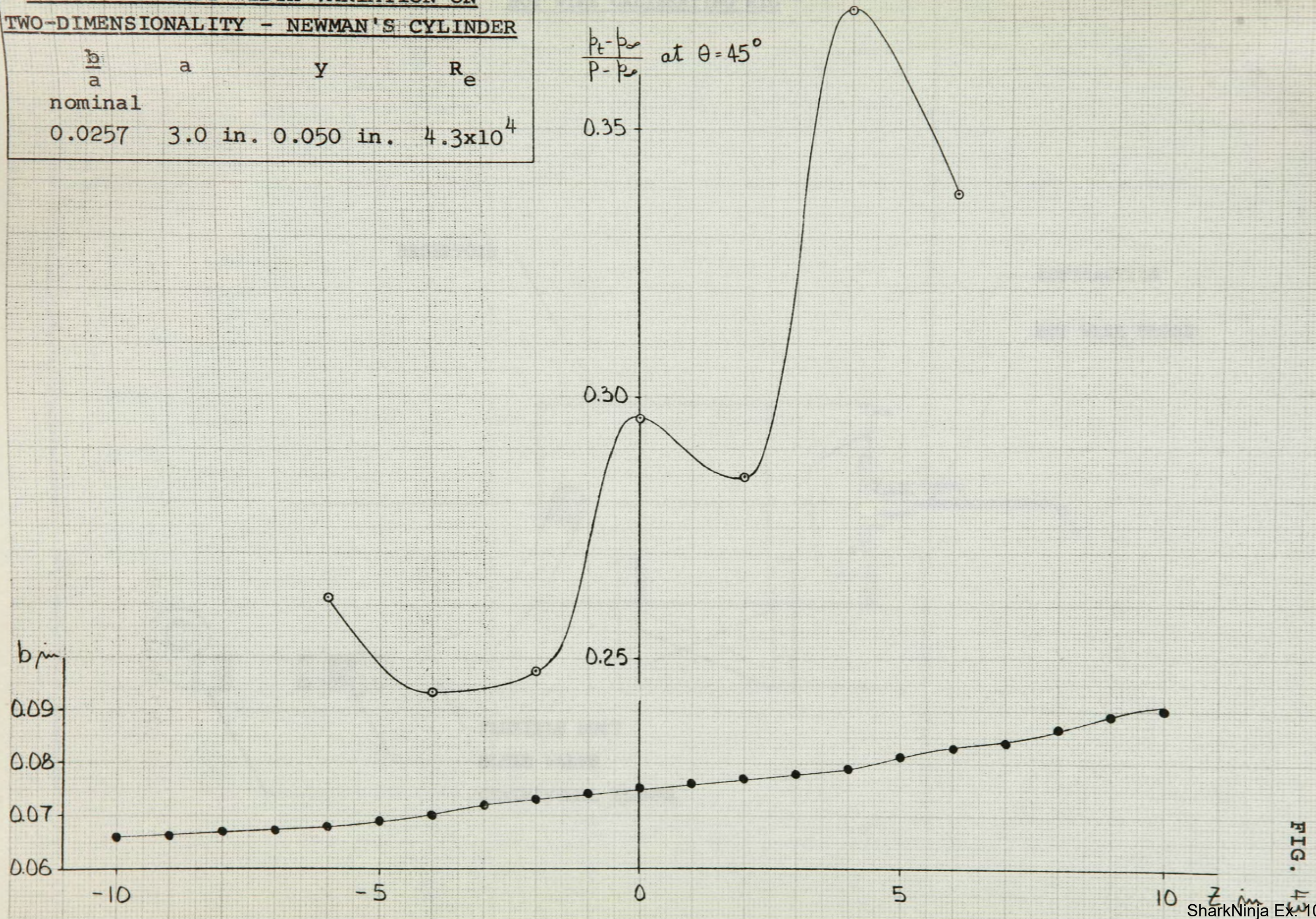
10

z in

FIG. 4.25

EFFECT OF SLOT WIDTH VARIATION ON
TWO-DIMENSIONALITY - NEWMAN'S CYLINDER

$\frac{b}{a}$	a	y	Re
nominal			
0.0257	3.0 in.	0.050 in.	4.3×10^4



HOT WIRE CALIBRATING RIG

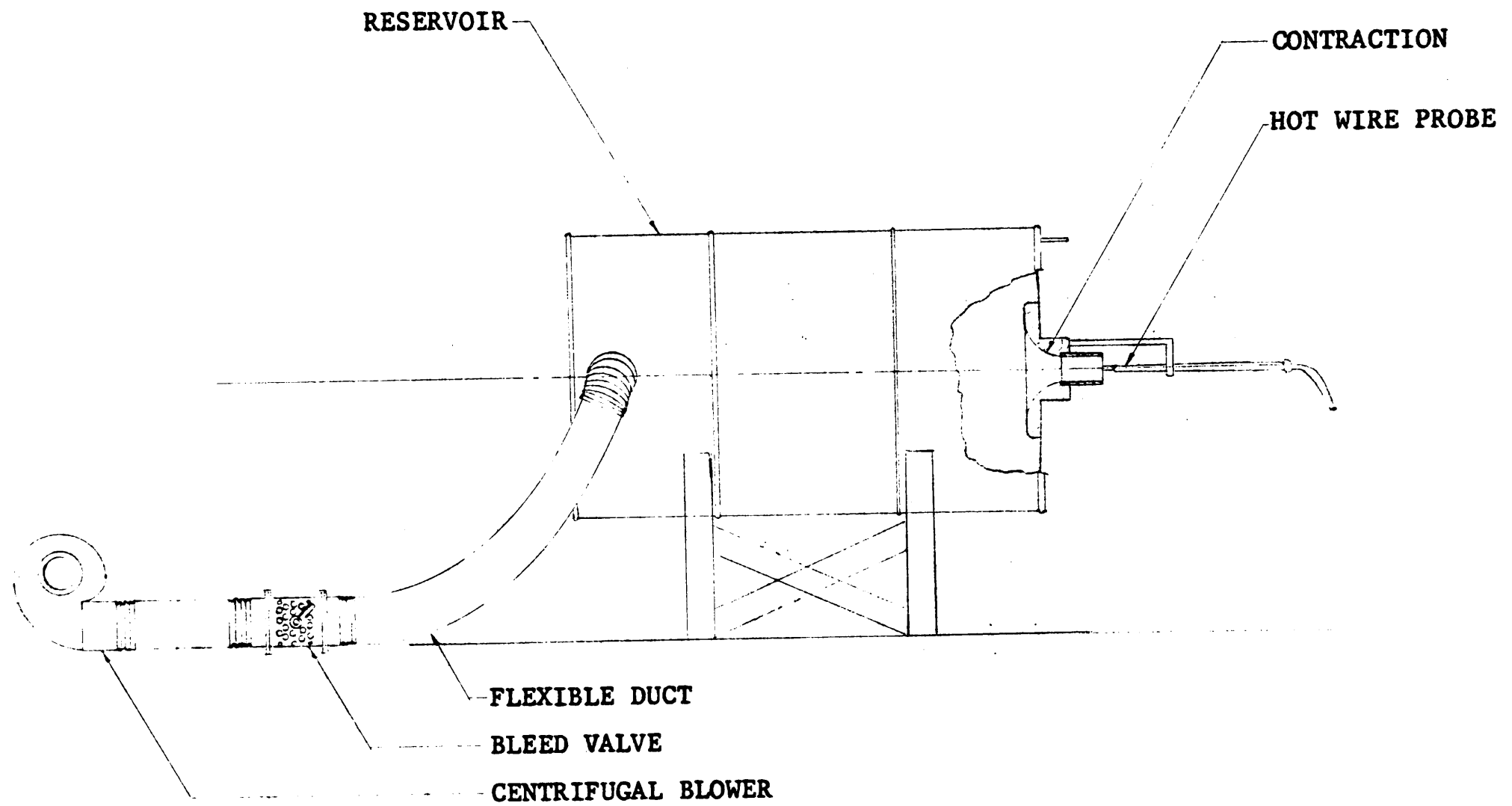


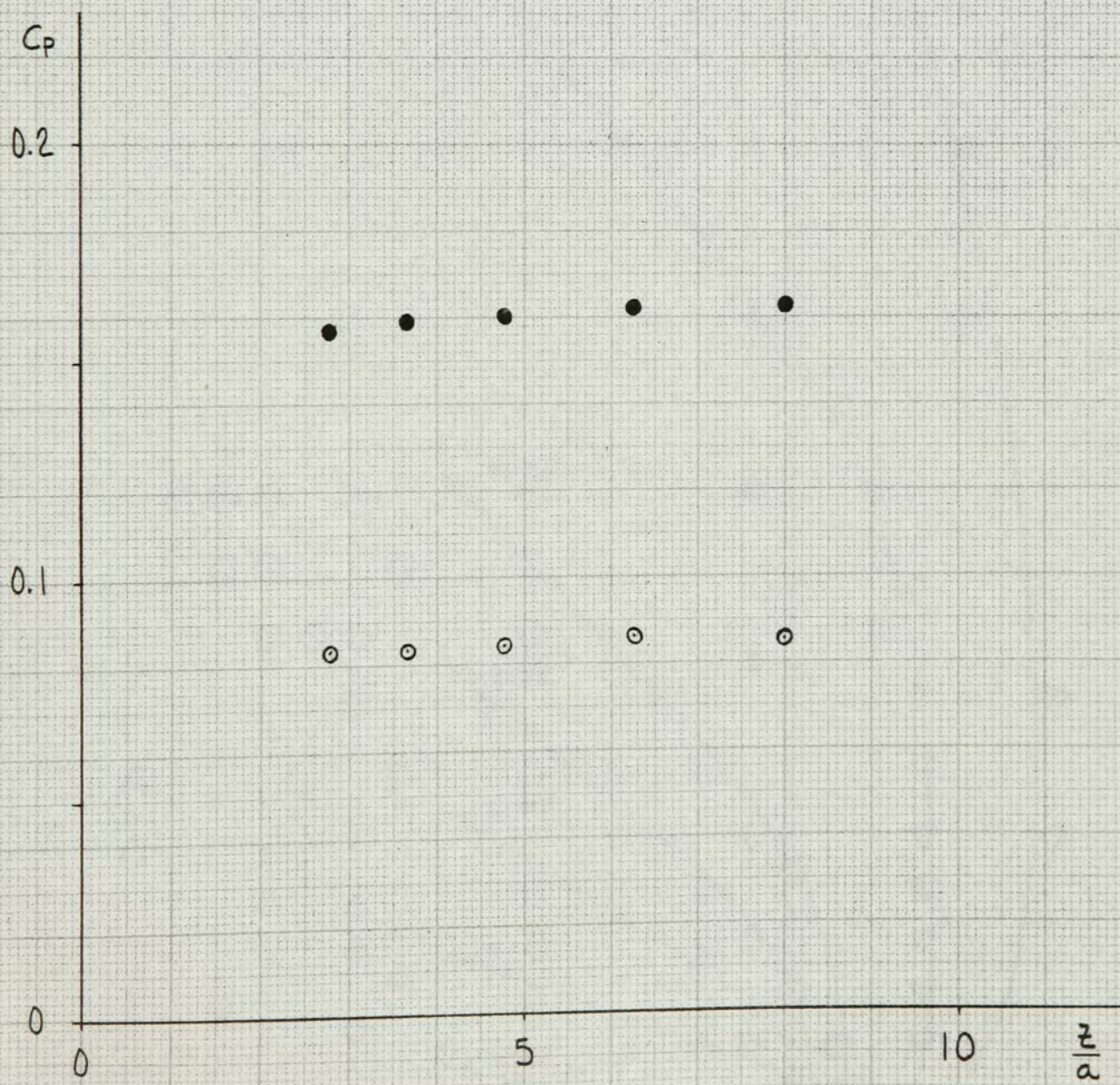
FIG. 44

EFFECT OF CHANGING ASPECT RATIO ON THE FLOW -
IMPROVED CYLINDER

FIG. 45

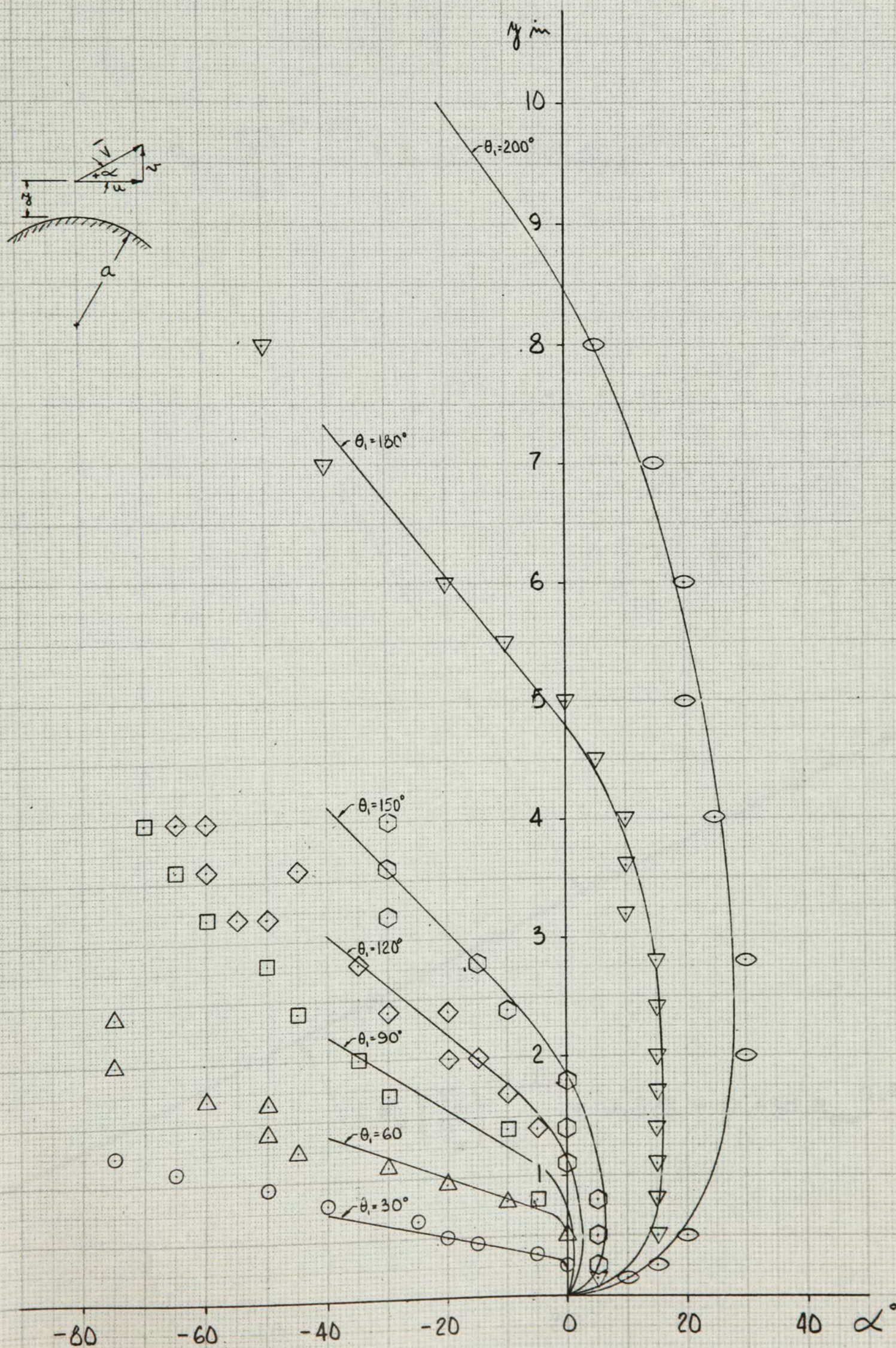
$\theta = 110^\circ$, $\frac{b}{a} = 0.0531$, $a = 4.0$ in., $Re = 7.65 \times 10^4$

$\circ \frac{p_\infty - p_s}{p - p_\infty}, \quad \bullet \frac{p_t - p_\infty}{p - p_\infty}$



LOCAL MEAN FLOW DIRECTION AT HIGH
REYNOLDS NUMBERS - IMPROVED CYLINDER

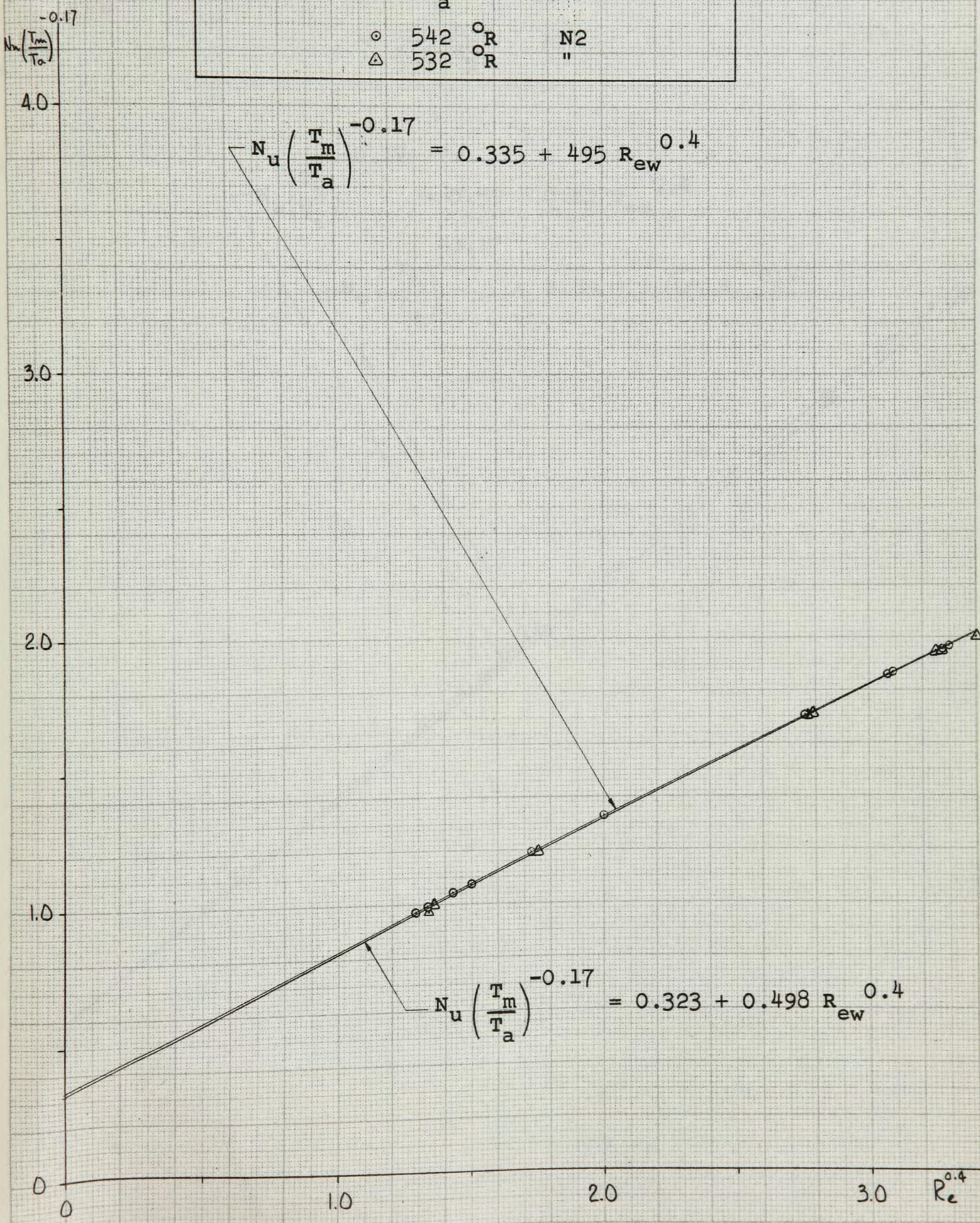
FIG. 46



EFFECT OF AMBIENT TEMPERATURE CHANGE
ON HOT WIRE CALIBRATION

FIG. 47

	T_a	H.W.
○	542 °R	N2
△	532 °R	"



**EFFECT OF AMBIENT TEMPERATURE CHANGE
ON HOT WIRE CALIBRATION**

FIG. 48

	T_a	H.W.
○	545 °R	N7
△	536 °R	"

