

図 4.17 各レイノルズ数における静翼出口での全圧損失分布
(軸方向位置 $Z_{NZ}/C_{az,NZ} = 1.156$, 主流乱れ度 $Tu_{in} = 0.5\%$)

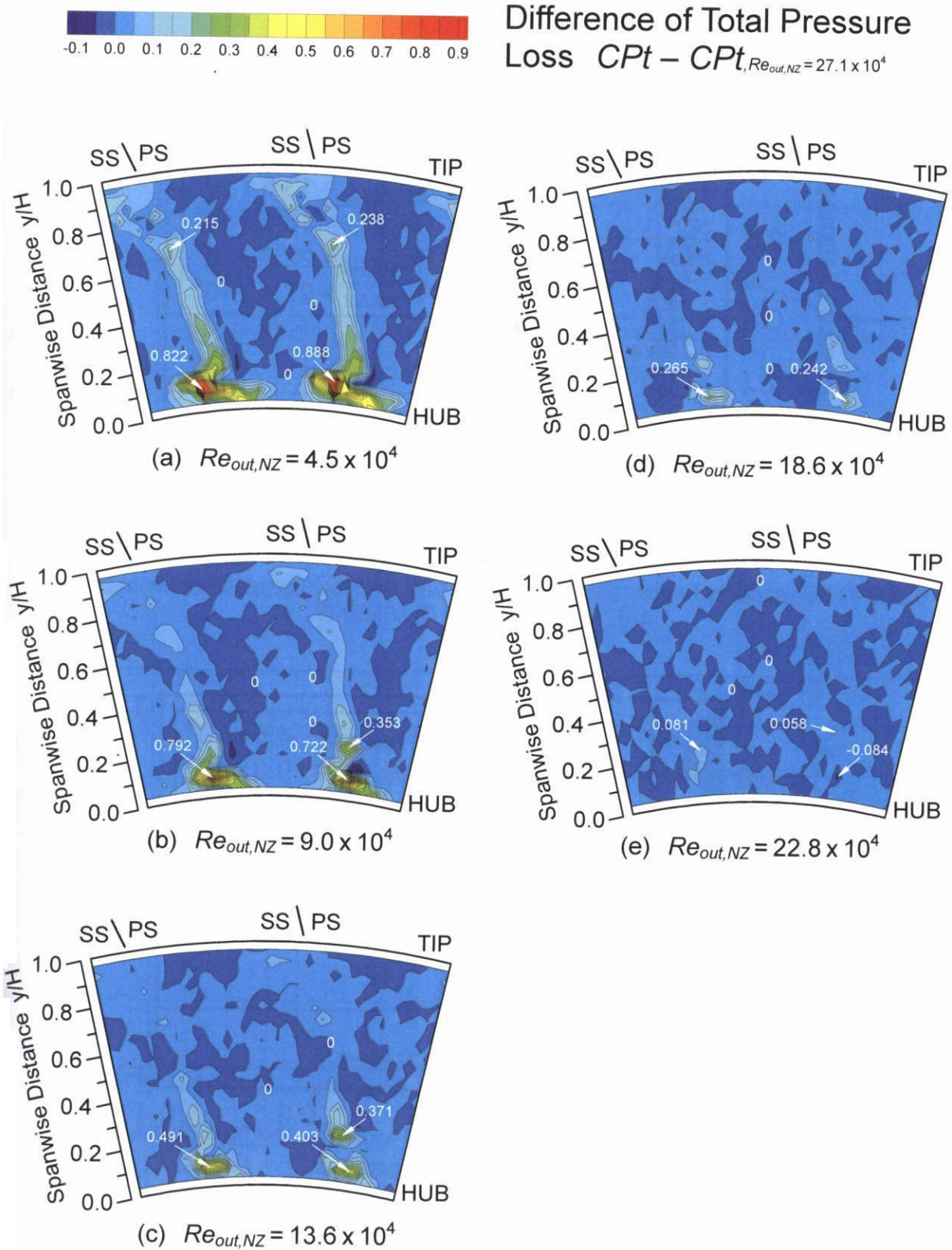
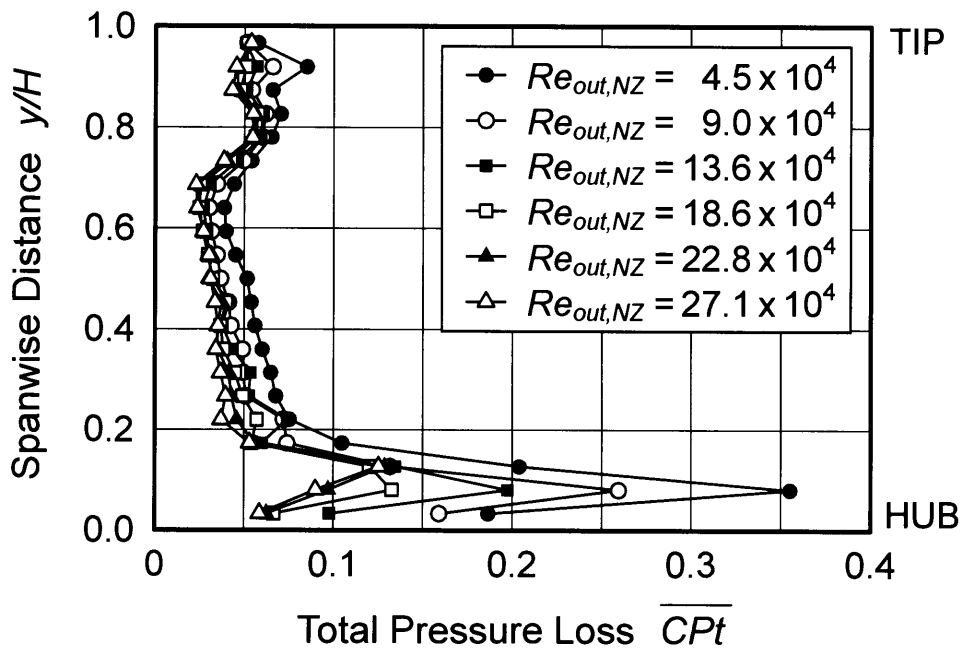
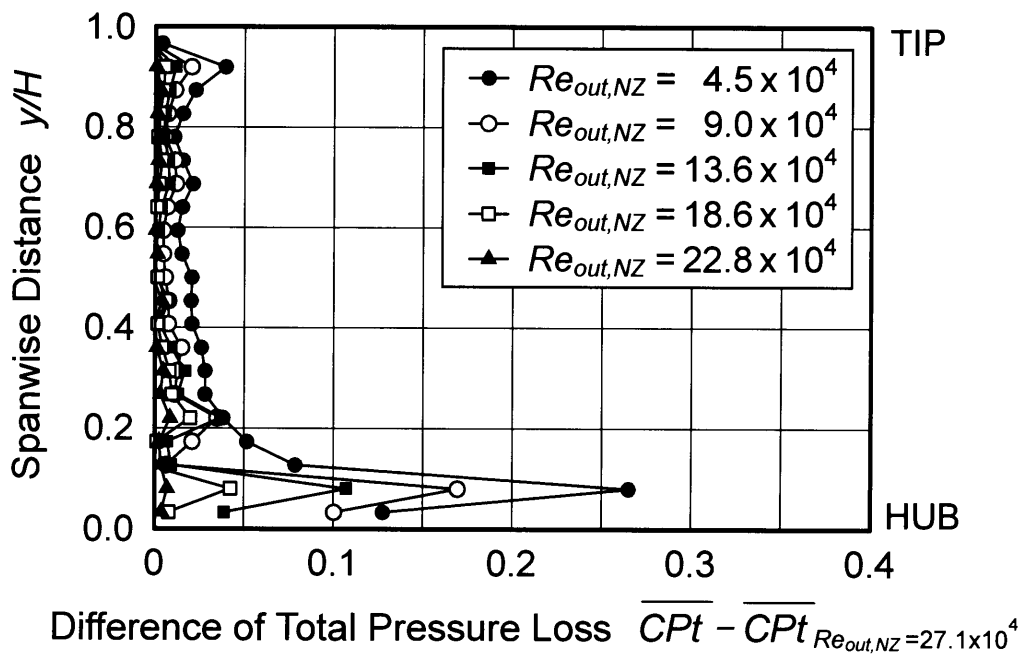


図 4.18 高レイノルズ数 $Re_{out,NZ} = 27.1 \times 10^4$ での全圧損失分布と各レイノルズ数での全圧損失分布の差 (軸方向位置 $Z_{NZ}/C_{ax,NZ} = 1.156$, 主流乱れ度 $Tu_{in} = 0.5\%$)

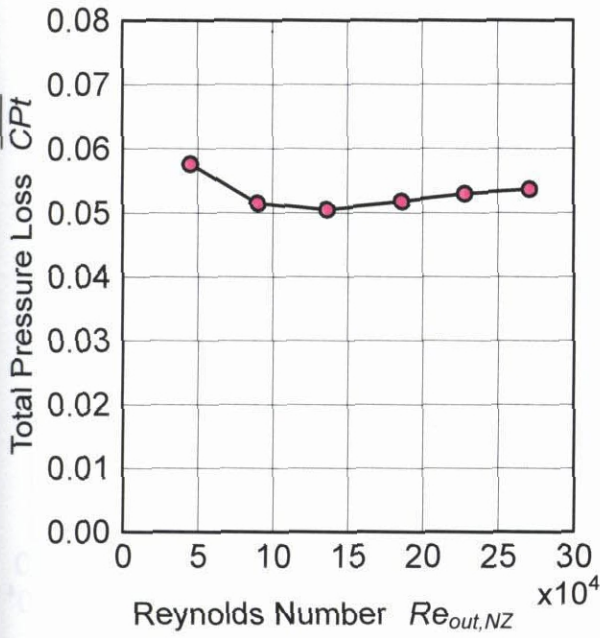


(a) 全圧損失の半径方向分布

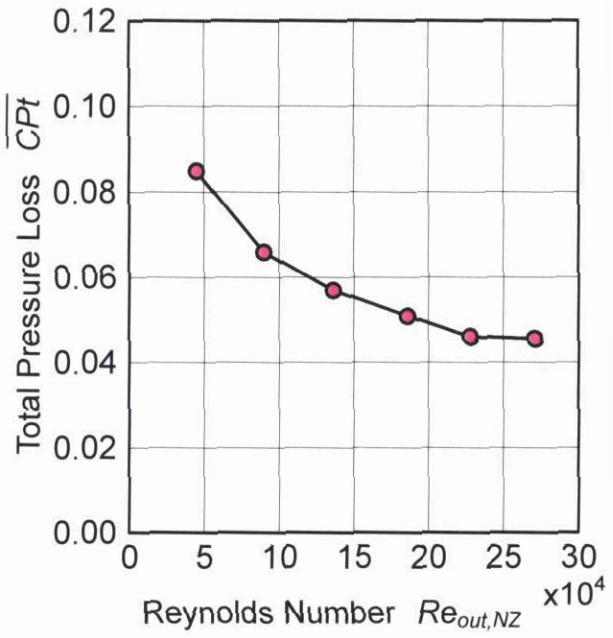


(b) $Re_{out,NZ}=27.1 \times 10^4$ における全圧損失との差

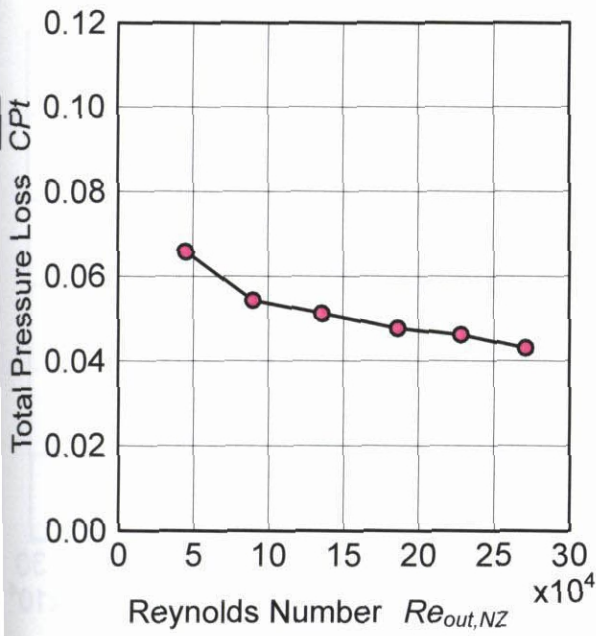
図 4.19 各レイノルズ数での全圧損失の半径方向分布
(主流乱れ度 $Tu_{in}=0.5\%$)



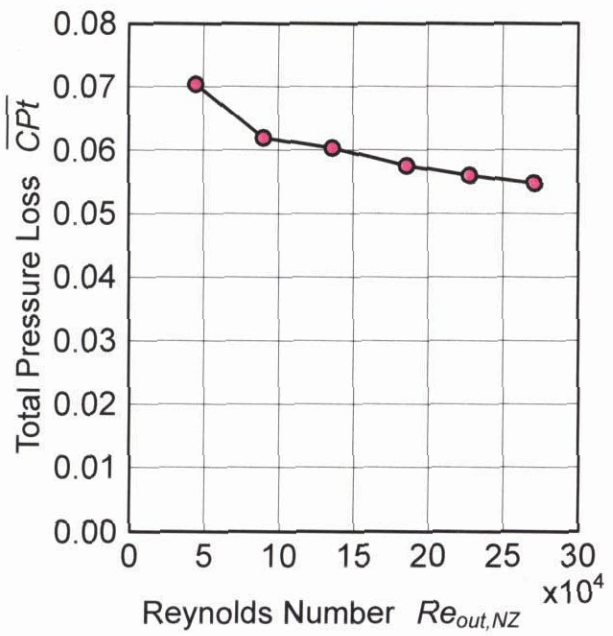
(a) Spanwise Distance $y/H = 0.967$



(b) Spanwise Distance $y/H = 0.920$



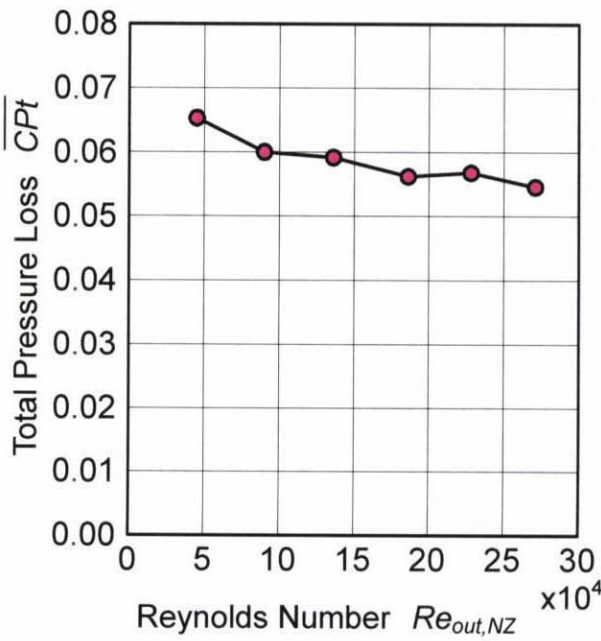
(c) Spanwise Distance $y/H = 0.873$



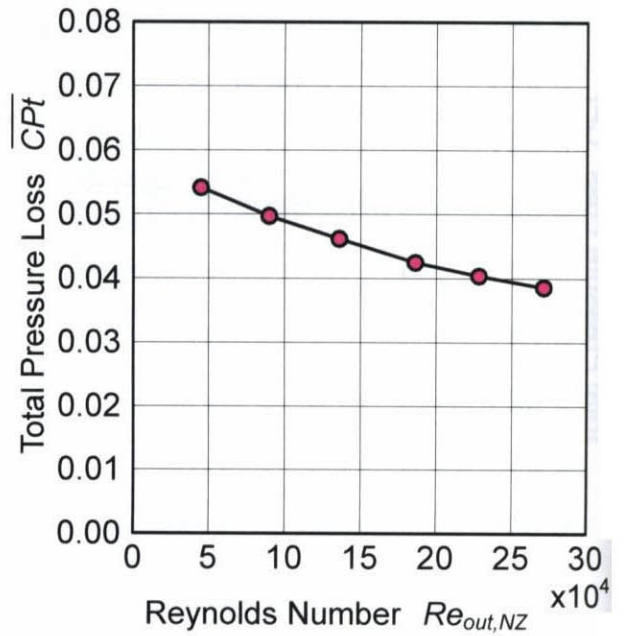
(d) Spanwise Distance $y/H = 0.827$

図4.20 静翼出口の各半径方向位置における損失へのレイノルズ数の影響
(その1)

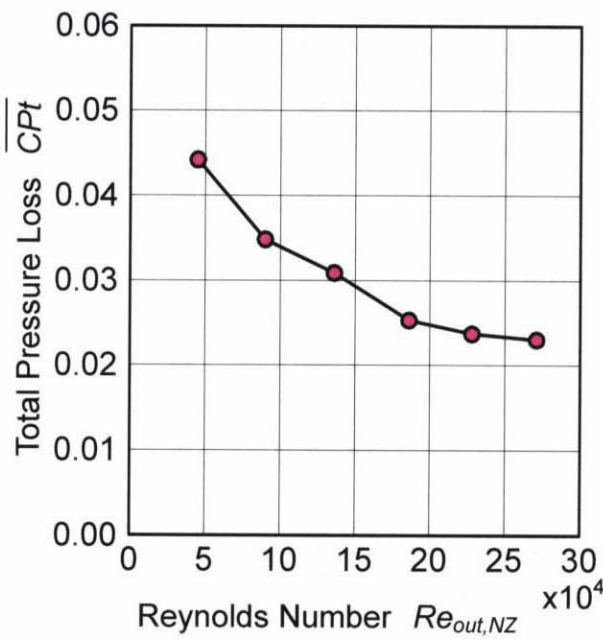
各半径方向位置でのピッチ方向平均損失 (主流乱れ度 $Tu_{in} = 0.5\%$)



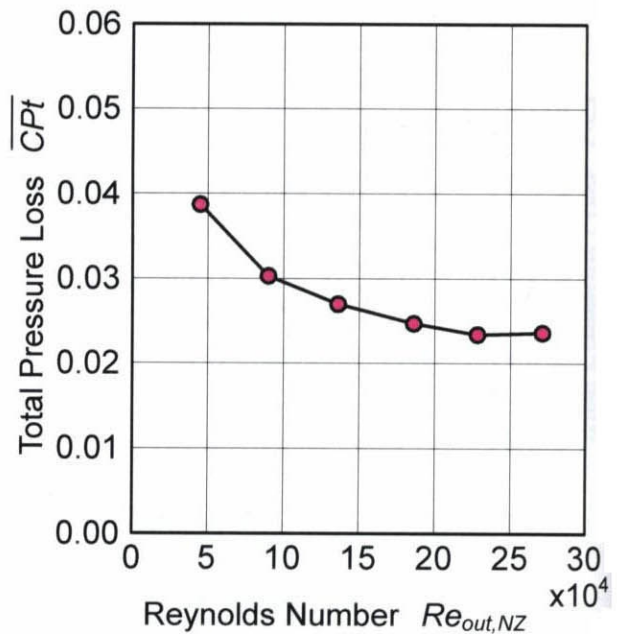
(e) Spanwise Distance $y/H = 0.780$



(f) Spanwise Distance $y/H = 0.733$

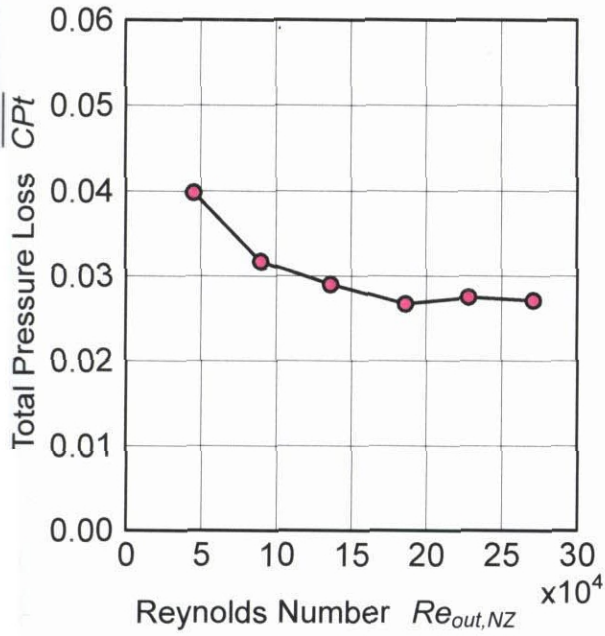


(g) Spanwise Distance $y/H = 0.687$

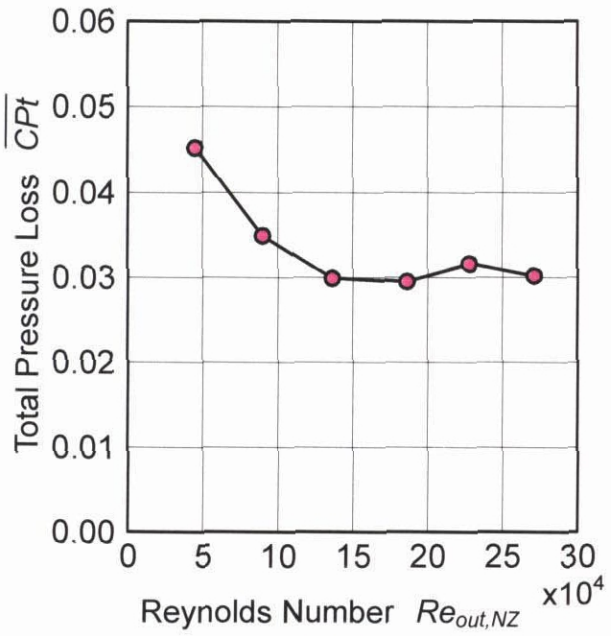


(h) Spanwise Distance $y/H = 0.640$

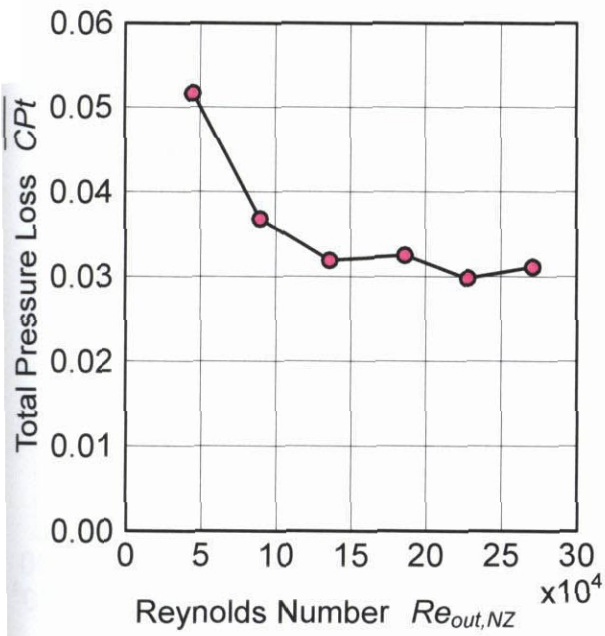
図 4.20 静翼出口の各半径方向位置における損失へのレイノルズ数の影響
(その2)
各半径方向位置でのピッチ方向平均損失 (主流乱れ度 $Tu_{in} = 0.5\%$)



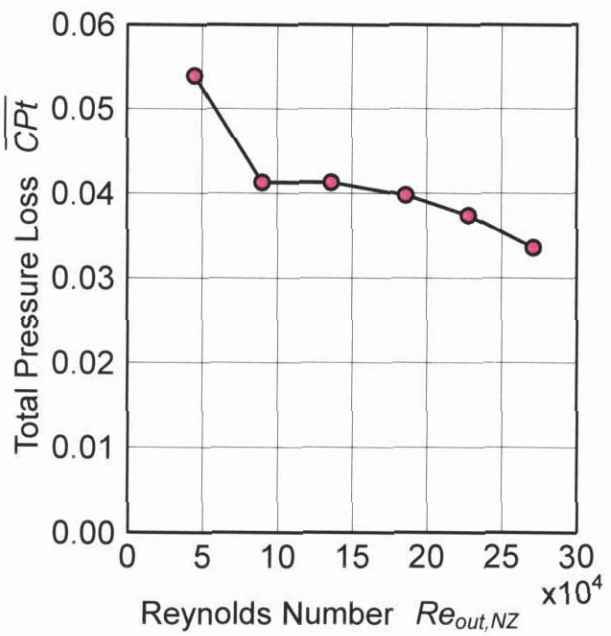
(i) Spanwise Distance $y/H = 0.593$



(j) Spanwise Distance $y/H = 0.547$



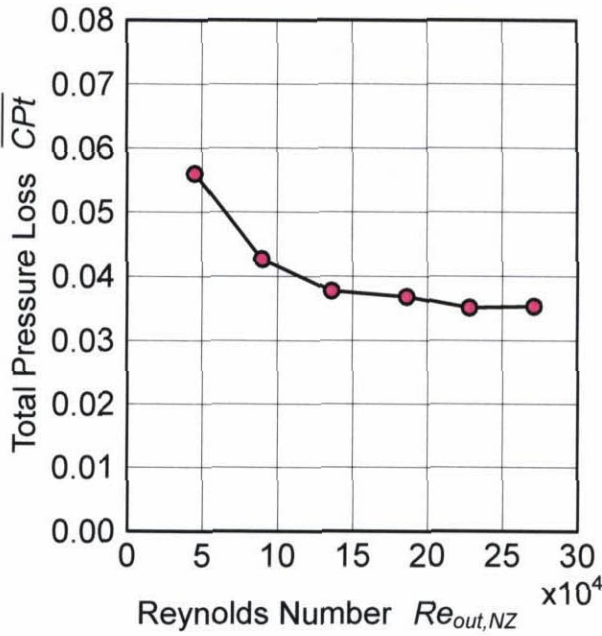
(k) Spanwise Distance $y/H = 0.500$



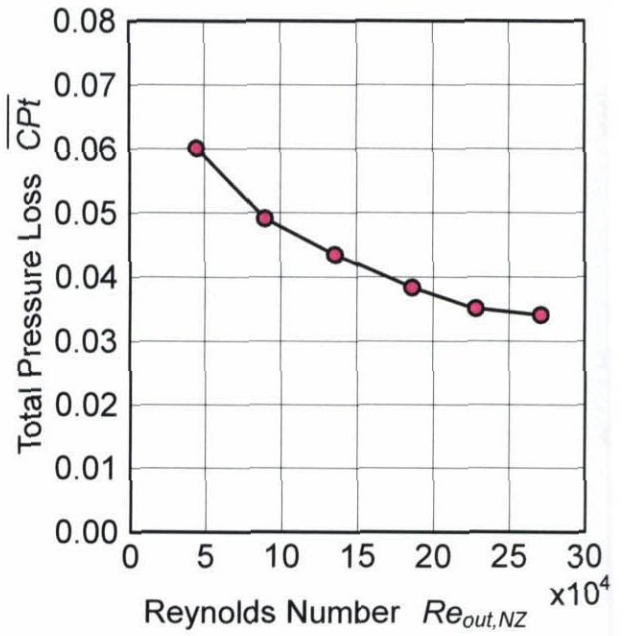
(l) Spanwise Distance $y/H = 0.453$

図 4.20 静翼出口の各半径方向位置における損失へのレイノルズ数の影響
(その3)

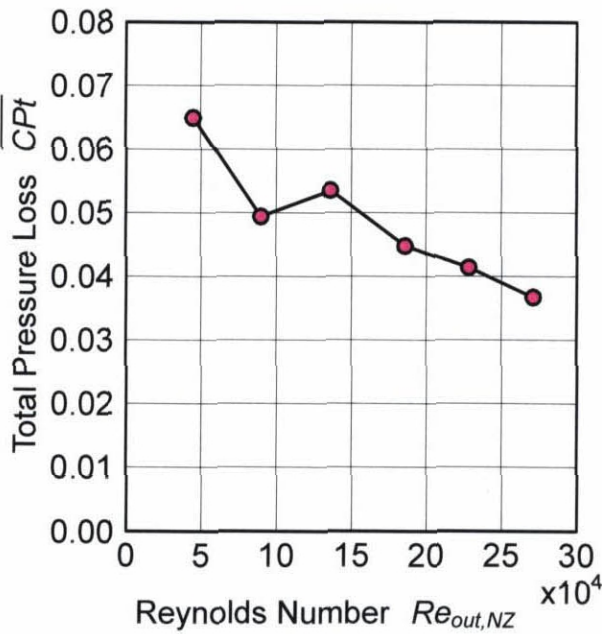
各半径方向位置でのピッチ方向平均損失 (主流乱れ度 $Tu_{in} = 0.5\%$)



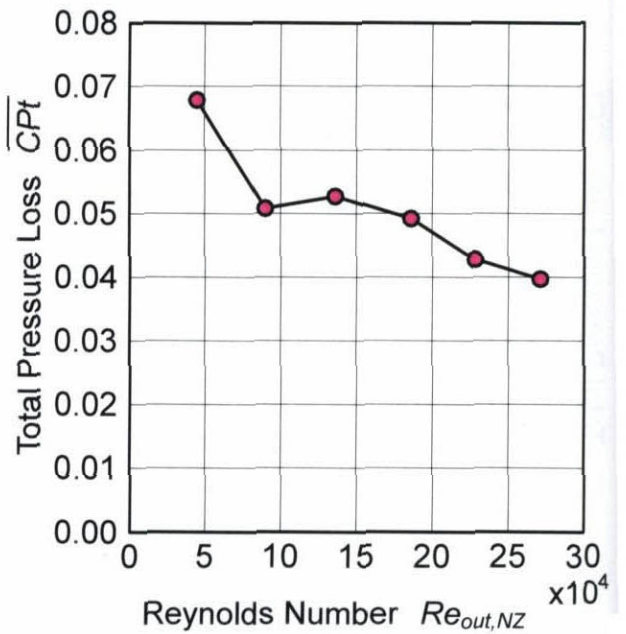
(m) Spanwise Distance $y/H = 0.407$



(n) Spanwise Distance $y/H = 0.360$

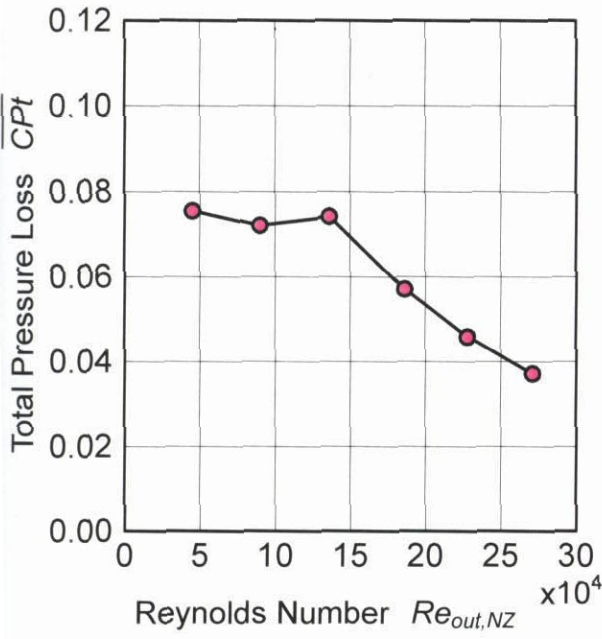


(o) Spanwise Distance $y/H = 0.313$

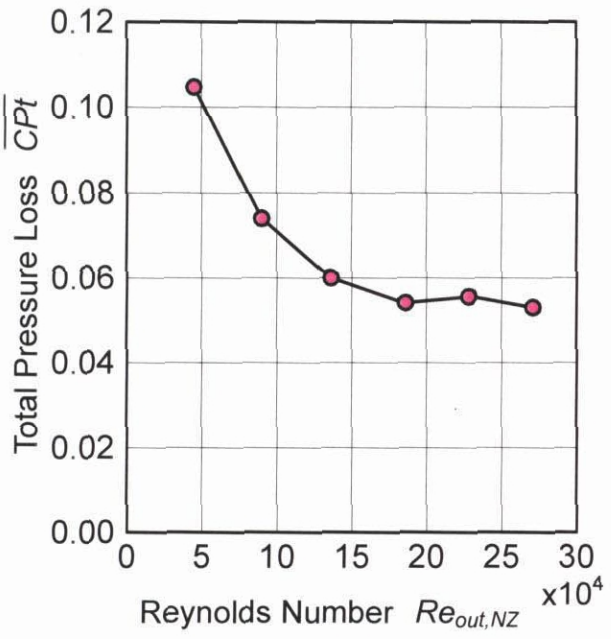


(p) Spanwise Distance $y/H = 0.267$

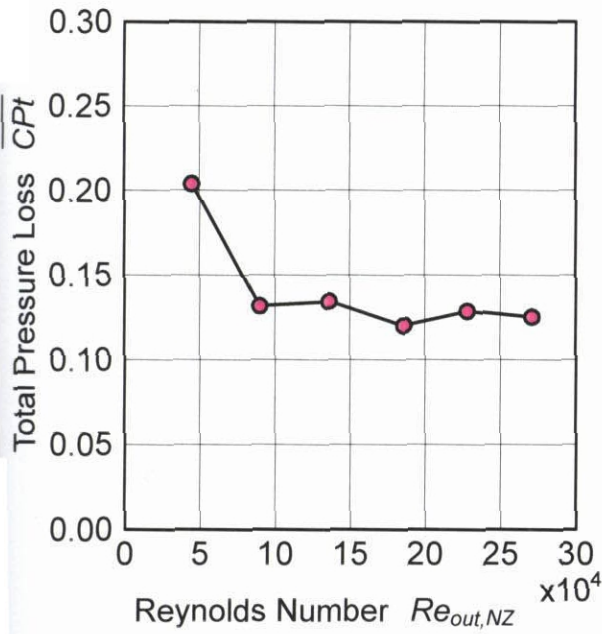
図 4.20 静翼出口の各半径方向位置における損失へのレイノルズ数の影響
 (その4)
 各半径方向位置でのピッチ方向平均損失 (主流乱れ度 $Tu_m = 0.5\%$)



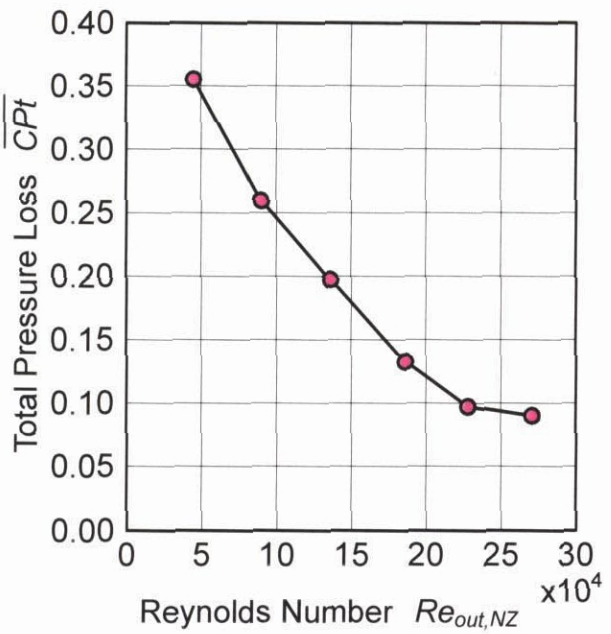
(q) Spanwise Distance $y/H=0.220$



(r) Spanwise Distance $y/H=0.173$



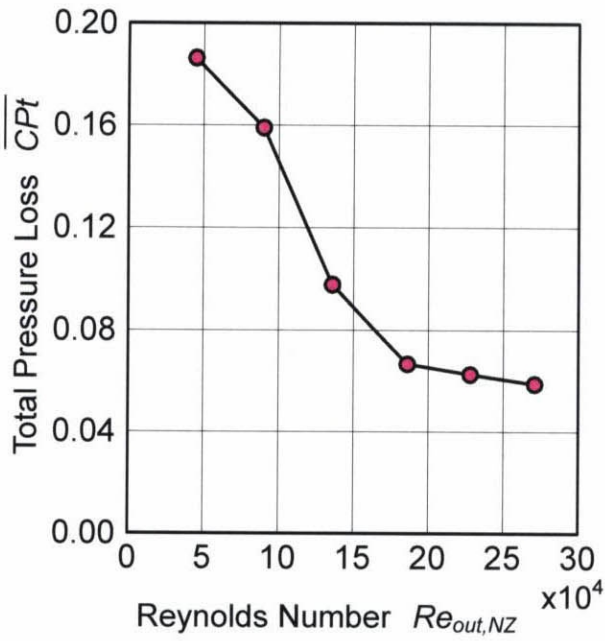
(s) Spanwise Distance $y/H=0.127$



(t) Spanwise Distance $y/H=0.080$

図 4.20 静翼出口の各半径方向位置における損失へのレイノルズ数の影響
(その5)

各半径方向位置でのピッチ方向平均損失 (主流乱れ度 $Tu_{in}=0.5\%$)



(u) Spanwise Distance $y/H = 0.033$

図 4.20 静翼出口の各半径方向位置における損失へのレイノルズ数の影響
 (その6)
 各半径方向位置でのピッチ方向平均損失 (主流乱れ度 $Tu_{in} = 0.5\%$)

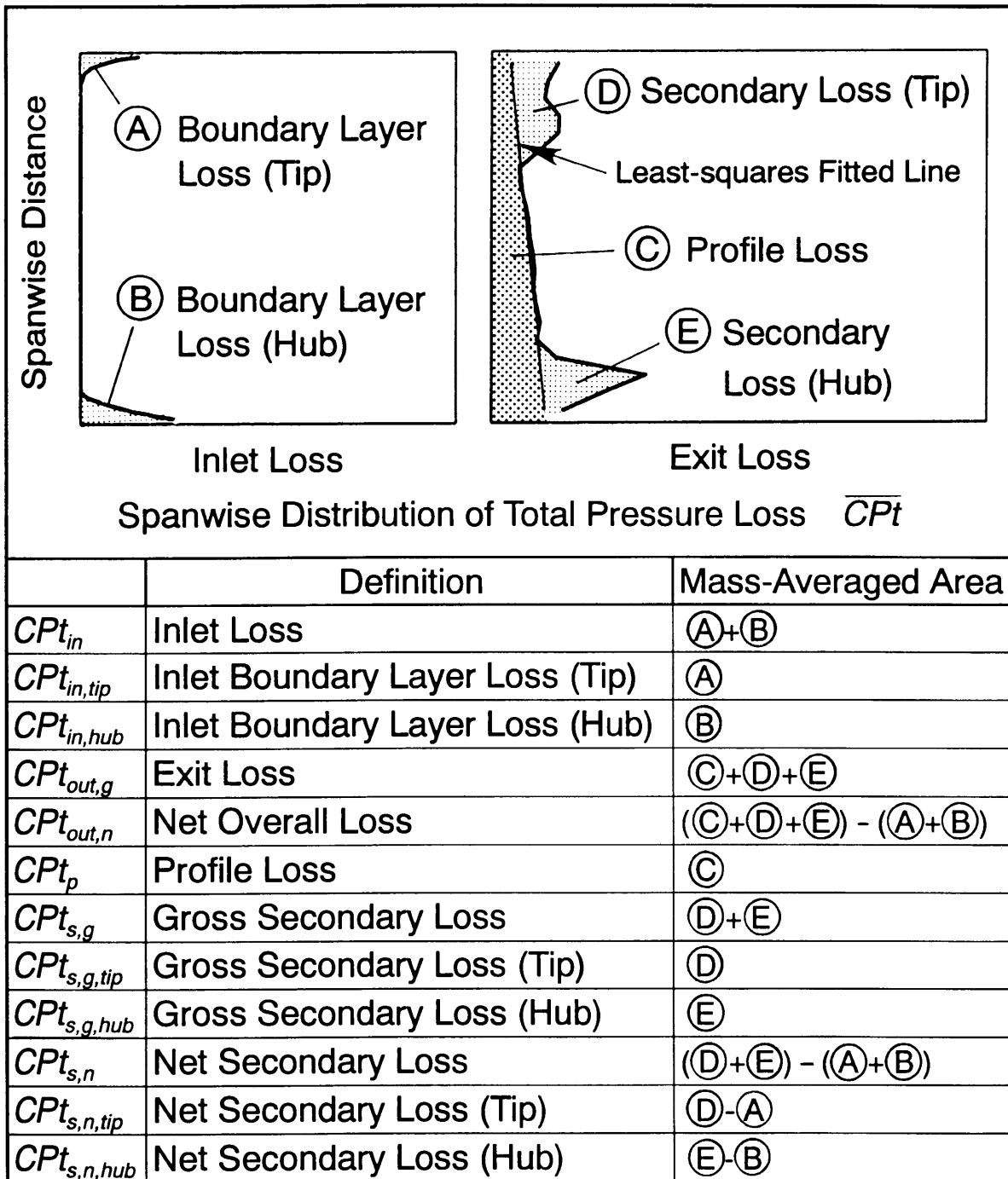


図 4.21 損失の分類法

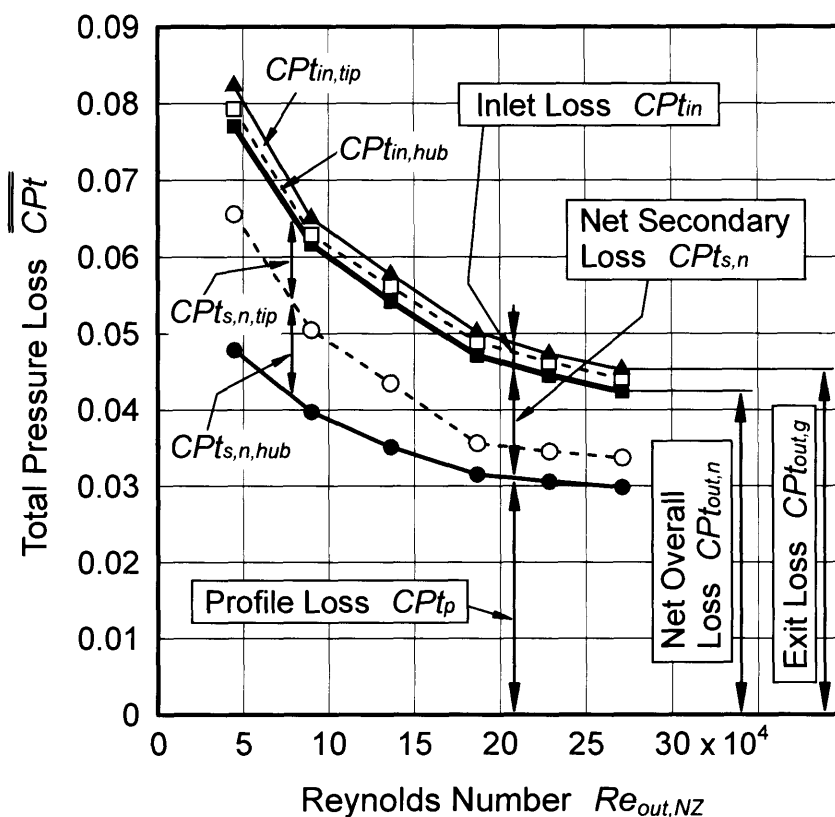


図 4.22 レイノルズ数が損失に与える影響
(主流乱れ度 $Tu_{in} = 0.5\%$)

表 4.5 $Re_{out,NZ} = 4.5 \times 10^4$ と 27.1×10^4 における損失値 ($Tu_{in} = 0.5\%$)

Losses		$Re_{out,NZ} = 4.5 \times 10^4$		$Re_{out,NZ} = 27.1 \times 10^4$	
Exit Loss	$Cpt_{out,g}$	0.0823	----	0.0452	----
Inlet Loss	Cpt_{in}	0.0053	----	0.0028	----
Tip	$Cpt_{in,tip}$	0.0031	----	0.0011	----
Hub	$Cpt_{in,hub}$	0.0022	----	0.0017	----
Net Overall Loss	$Cpt_{out,n}$	0.0770	100%	0.0424	100%
Profile Loss	Cpt_p	0.0478	60.1%	0.0298	70.3%
Net Secondary Loss	$Cpt_{s,n}$	0.0292	39.9%	0.0126	29.7%
Tip	$Cpt_{s,n,tip}$	0.0115	18.0%	0.0087	20.5%
Hub	$Cpt_{s,n,hub}$	0.0177	21.9%	0.0039	9.2%

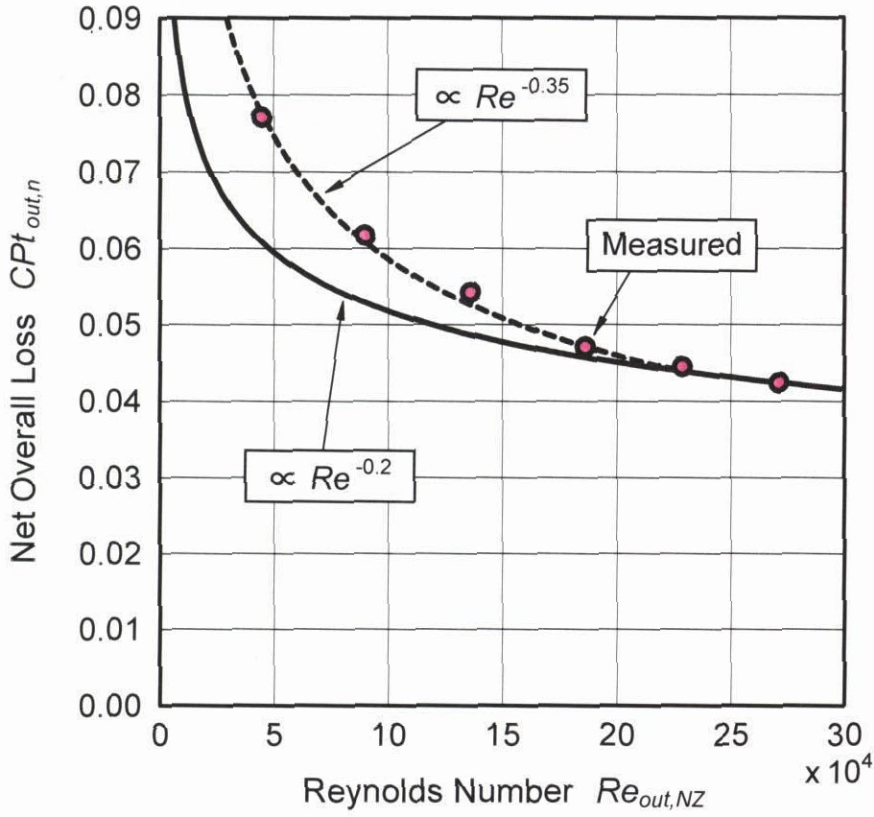


図 4.23 正味総全圧損失（翼列損失）とレイノルズ数の関係
 （主流乱れ度 $Tu_{in} = 0.5\%$ ）

表 4.6 正味総全圧損失（翼列損失）とレイノルズ数相関（ -0.2 乗）
 の比較（主流乱れ度 $Tu_{in} = 0.5\%$ ）

Reynolds Number $Re_{out,NZ}$	Measured Net Overall Loss $Cpt_{out,n}$	Reynolds No. Correlation [$\propto Re^{-0.2}$] $Cpt_{\propto Re^{-0.2}}$	Deviation $Cpt_{out,n} - Cpt_{\propto Re^{-0.2}}$	Deviation % $\frac{Cpt_{out,n} - Cpt_{\propto Re^{-0.2}}}{Cpt_{\propto Re^{-0.2}}}$
4.5×10^4	0.0771	0.0609	+0.0162	+26.6%
9.0×10^4	0.0617	0.0529	+0.0088	+16.6%
13.6×10^4	0.0543	0.0487	+0.0054	+11.1%
18.6×10^4	0.0471	0.0457	+0.0014	+3.1%
22.8×10^4	0.0445	0.0439	+0.0006	+1.4%
27.1×10^4	0.0424	0.0424	0.0000	0.0%

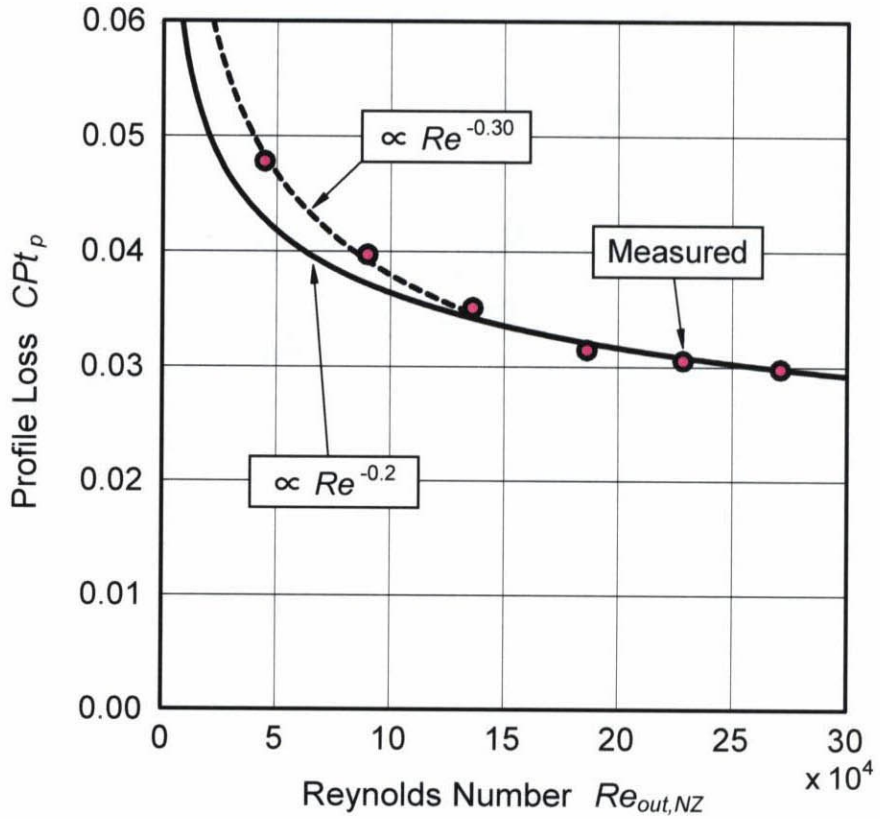


図 4.24 形状損失とレイノルズ数の関係
(主流乱れ度 $Tu_{in} = 0.5\%$)

表 4.7 形状損失とレイノルズ数相関 (-0.2 乗) の比較
(主流乱れ度 $Tu_{in} = 0.5\%$)

Reynolds Number $Re_{out,NZ}$	Measured Profile Loss Cpt_p	Reynolds No. Correlation [$\propto Re^{-0.2}$] $Cpt_{\propto Re^{-0.2}}$	Deviation $Cpt_p - Cpt_{\propto Re^{-0.2}}$	Deviation % $\frac{Cpt_p - Cpt_{\propto Re^{-0.2}}}{Cpt_{\propto Re^{-0.2}}}$
4.5×10^4	0.0478	0.0427	+0.0051	+11.9%
9.0×10^4	0.0397	0.0372	+0.0025	+6.7%
13.6×10^4	0.0351	0.0342	+0.0009	+2.6%
18.6×10^4	0.0315	0.0321	-0.0006	-1.9%
22.8×10^4	0.0306	0.0308	-0.0002	-0.6%
27.1×10^4	0.0298	0.0298	0.0000	0.0%

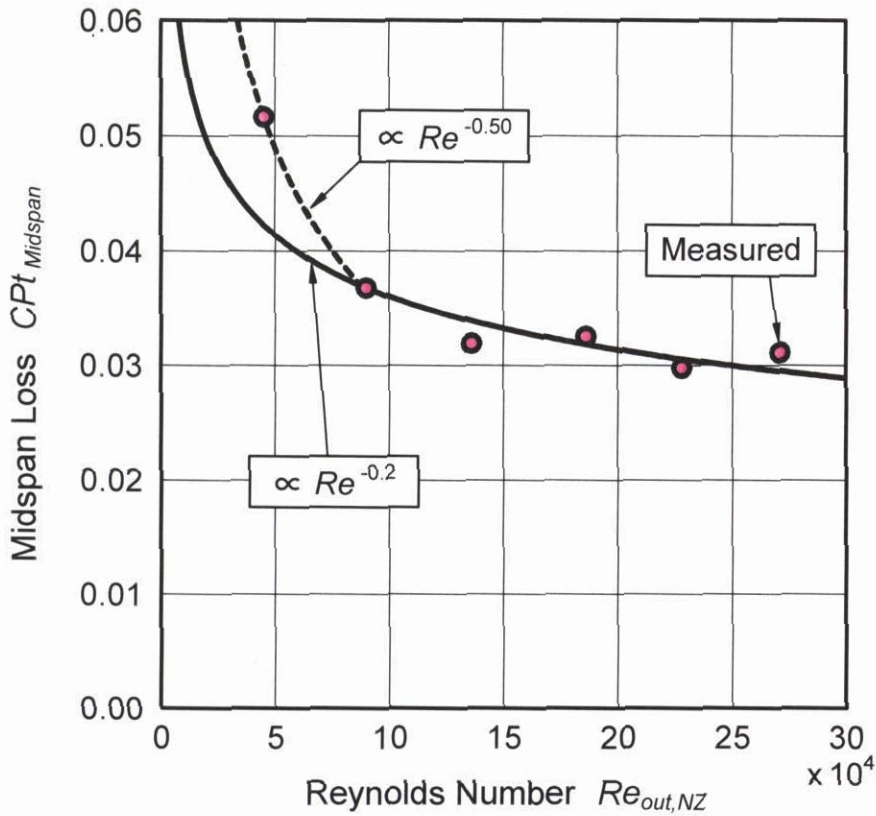


図 4.25 ミッドスパン損失とレイノルズ数の関係
(主流乱れ度 $Tu_{in}=0.5\%$)

表 4.8 ミッドスパン損失とレイノルズ数相関 (-0.2 乗) の比較
(主流乱れ度 $Tu_{in}=0.5\%$)

Reynolds Number $Re_{out,NZ}$	Measured Midspan Loss Cpt_p	Reynolds No. Correlation [$\propto Re^{-0.2}$] $Cpt_{\propto Re^{-0.2}}$	Deviation $Cpt_p - Cpt_{\propto Re^{-0.2}}$	Deviation % $\frac{Cpt_p - Cpt_{\propto Re^{-0.2}}}{Cpt_{\propto Re^{-0.2}}}$
4.5×10^4	0.0516	0.0423	+0.0093	+22.0%
9.0×10^4	0.0368	0.0368	0.0000	0.0%
13.6×10^4	0.0319	0.0339	-0.0020	-5.9%
18.6×10^4	0.0325	0.0318	+0.0007	+2.2%
22.8×10^4	0.0298	0.0305	-0.0007	-2.3%
27.1×10^4	0.0311	0.0295	+0.0016	+5.4%

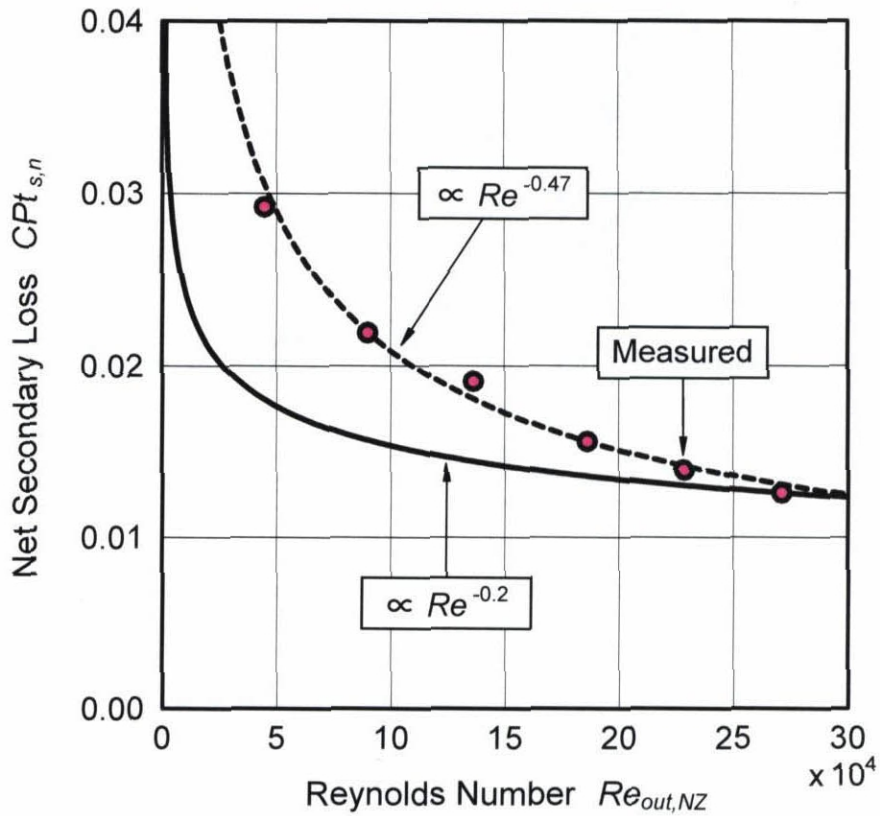


図 4.26 正味二次損失とレイノルズ数の関係
(主流乱れ度 $Tu_{in} = 0.5\%$)

表 4.9 正味二次損失とレイノルズ数相関 (-0.2 乗) の比較
(主流乱れ度 $Tu_{in} = 0.5\%$)

Reynolds Number $Re_{out,NZ}$	Measured Net Secondary Loss $Cpt_{s,n}$	Reynolds No. Correlation [$\propto Re^{-0.2}$] $Cpt_{\propto Re^{-0.2}}$	Deviation $Cpt_{s,n} - Cpt_{\propto Re^{-0.2}}$	Deviation % $\frac{Cpt_{s,n} - Cpt_{\propto Re^{-0.2}}}{Cpt_{\propto Re^{-0.2}}}$
4.5×10^4	0.0292	0.0180	+0.0112	+62.2%
9.0×10^4	0.0219	0.0157	+0.0062	+39.5%
13.6×10^4	0.0191	0.0144	+0.0047	+32.6%
18.6×10^4	0.0156	0.0136	+0.0020	+14.7%
22.8×10^4	0.0139	0.0130	+0.0009	+6.9%
27.1×10^4	0.0126	0.0126	0.0000	0.0%

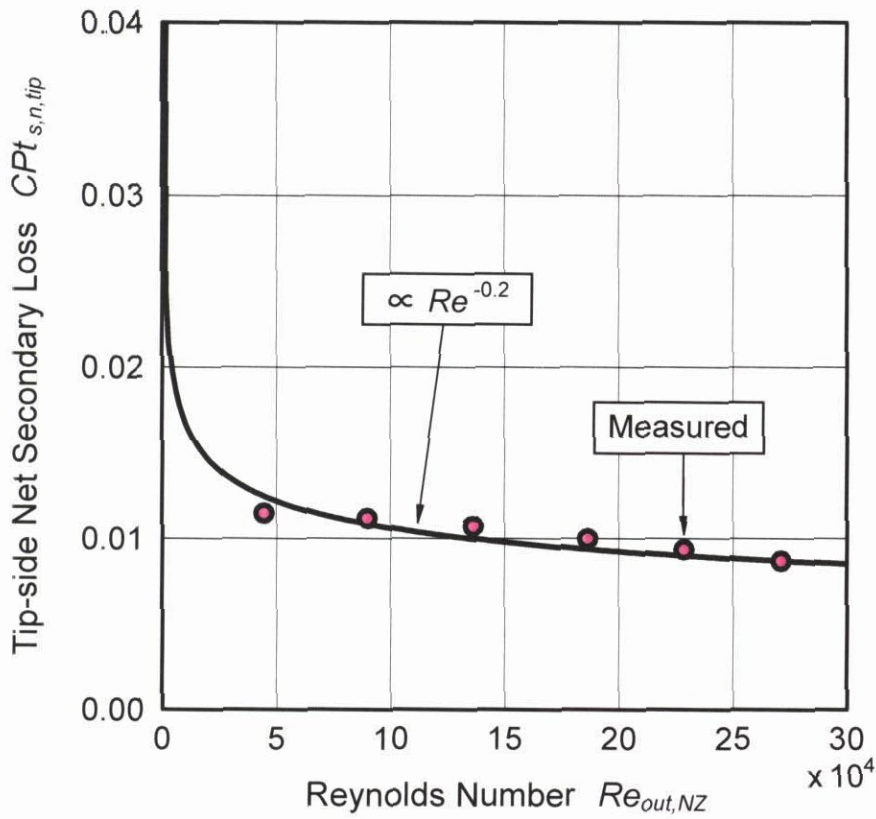


図 4.27 チップ側の正味二次損失とレイノルズ数の関係
(主流乱れ度 $Tu_{in} = 0.5\%$)

表 4.10 チップ側の正味二次損失とレイノルズ数相関 (-0.2 乗) の比較
(主流乱れ度 $Tu_{in} = 0.5\%$)

Reynolds Number $Re_{out,NZ}$	Measured Net Secondary Loss $Cpt_{s,n,tip}$	Reynolds No. Correlation [$\propto Re^{-0.2}$] $Cpt_{\propto Re^{-0.2}}$	Deviation $Cpt_{s,n,tip} - Cpt_{\propto Re^{-0.2}}$	Deviation % $\frac{Cpt_{s,n,tip} - Cpt_{\propto Re^{-0.2}}}{Cpt_{\propto Re^{-0.2}}}$
4.5×10^4	0.0115	0.0125	-0.0010	-8.0%
9.0×10^4	0.0112	0.0108	+0.0004	+3.7%
13.6×10^4	0.0107	0.0100	+0.0007	+7.0%
18.6×10^4	0.0100	0.0094	+0.0006	+6.4%
22.8×10^4	0.0094	0.0090	+0.0004	+4.4%
27.1×10^4	0.0087	0.0087	0.0000	0.0%

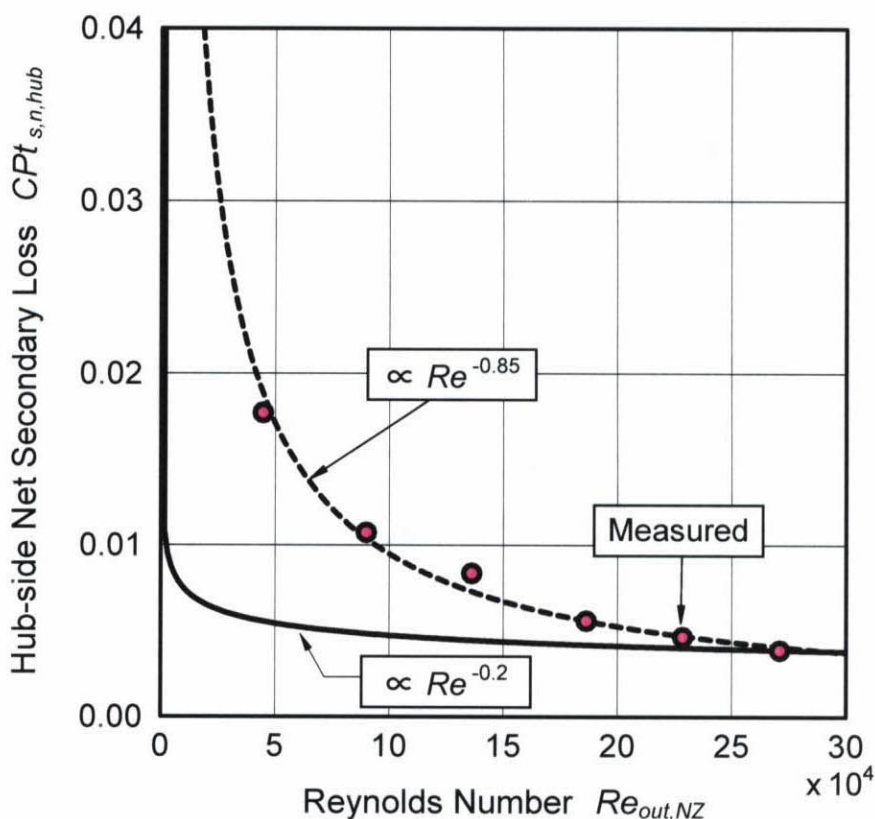


図 4.28 ハブ側の正味二次損失とレイノルズ数の関係
(主流乱れ度 $Tu_{in} = 0.5\%$)

表 4.11 ハブ側の正味二次損失とレイノルズ数相関 (-0.2 乗) の比較
(主流乱れ度 $Tu_{in} = 0.5\%$)

Reynolds Number $Re_{out,NZ}$	Measured Net Secondary Loss $Cpt_{s,n,hub}$	Reynolds No. Correlation [$\propto Re^{-0.2}$] $Cpt_{\propto Re^{-0.2}}$	Deviation $Cpt_{s,n,hub} - Cpt_{\propto}$	Deviation % $\frac{Cpt_{s,n,hub} - Cpt_{\propto Re^{-0.2}}}{Cpt_{\propto Re^{-0.2}}}$
4.5×10^4	0.0177	0.0056	+0.0121	+216.1%
9.0×10^4	0.0108	0.0048	+0.0060	+125.0%
13.6×10^4	0.0084	0.0044	+0.0040	+90.9%
18.6×10^4	0.0056	0.0042	+0.0014	+33.3%
22.8×10^4	0.0047	0.0040	+0.0007	+17.5%
27.1×10^4	0.0039	0.0039	0.0000	0.0%