FLOW AROUND CYLINDER   CE358 – Fall '95 – S.Kinnas

Re = 0 (inviscid flow)

$\frac{p - p_0}{\frac{1}{2}\rho U^2}$

6·7 × 10⁵

8·4 × 10⁶

$\frac{UD}{\nu} = 1\cdot1 \times 10^5$

Wholly irrotational flow

Degrees from forward stagnation point

ϑ

$Re = \frac{UD}{\nu}$
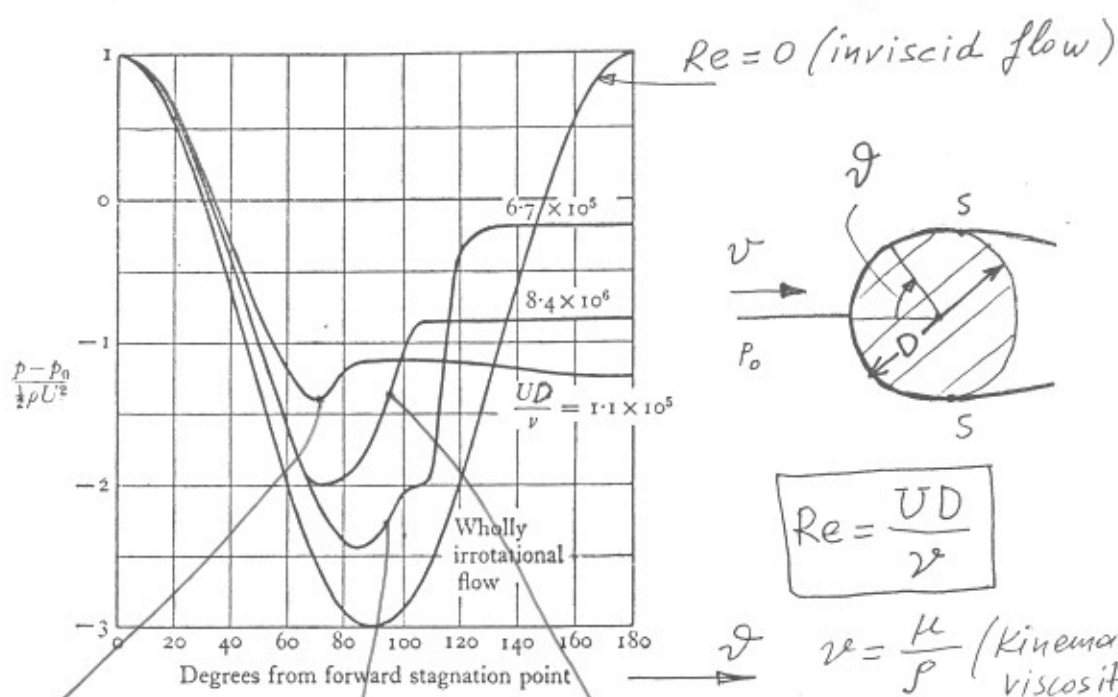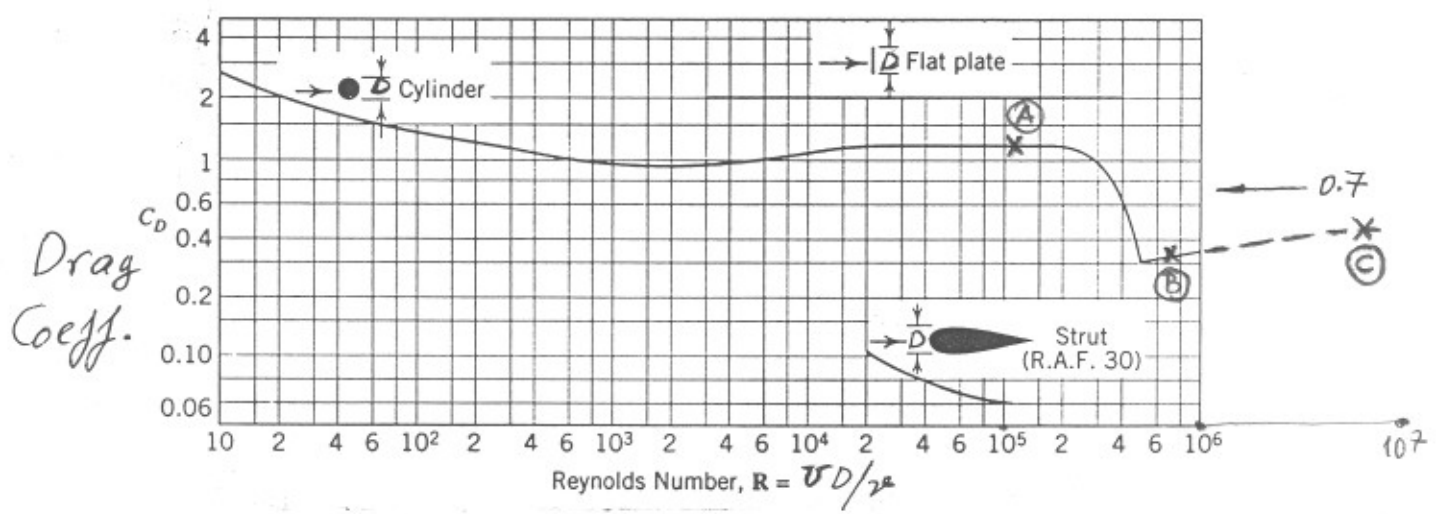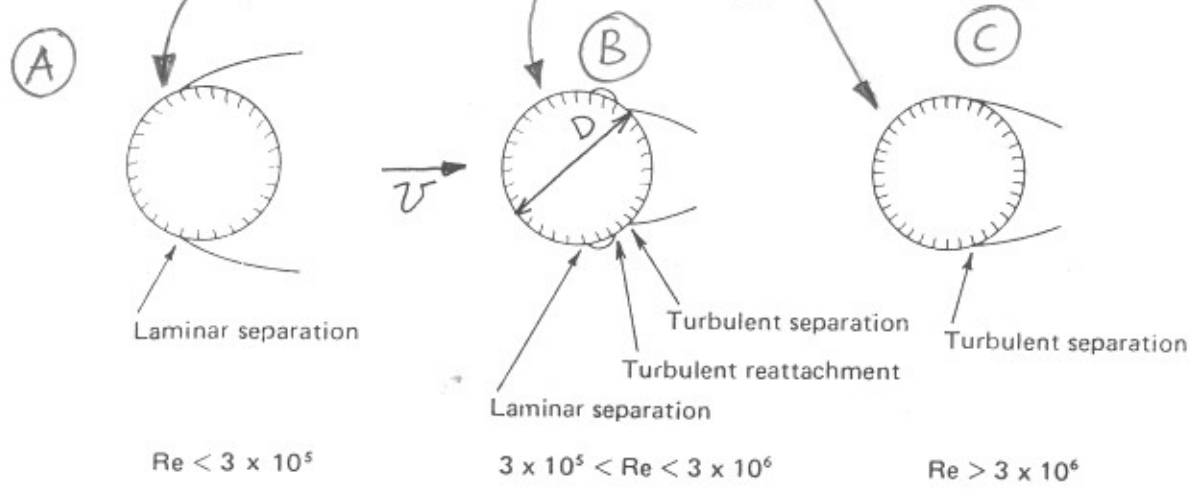
$\nu = \frac{\mu}{\rho}$ (Kinematic viscosity)

Figure 5.11.5. The measured pressure distribution at the surface of a circular cylinder in a stream of speed U at different Reynolds numbers; p_0 = pressure at infinity.

Ⓐ

Laminar separation

Re < 3 × 10⁵

$\vec{v}$

Ⓑ

Turbulent separation

Turbulent reattachment

Laminar separation

3 × 10⁵ < Re < 3 × 10⁶

Ⓒ

Turbulent separation

Re > 3 × 10⁶

Drag Coeff.

C_D

Cylinder

Flat plate

Ⓐ

0.7

Ⓒ

Ⓑ

Strut (R.A.F. 30)

Reynolds Number, $R = \frac{UD}{\nu}$

$10 \quad 2 \quad 4 \quad 6 \quad 10^2 \quad 2 \quad 4 \quad 6 \quad 10^3 \quad 2 \quad 4 \quad 6 \quad 10^4 \quad 2 \quad 4 \quad 6 \quad 10^5 \quad 2 \quad 4 \quad 6 \quad 10^6 \quad 10^7$

$D = \text{Drag force / Unit width} = C_D \cdot \frac{1}{2} \rho \cdot U^2 \cdot D$