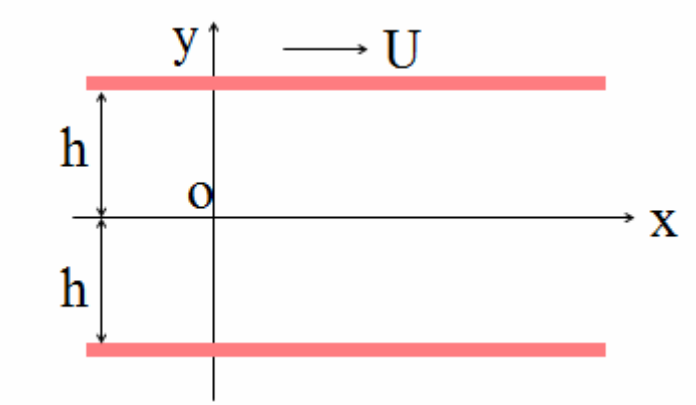
Aerodynamics-TD3

Boundary Layer and Over Drag

Exercise 1：

Flow between two parallel walls(as shown below), steady, incompressible, neglect body force, 2-D. Determine velocity distribution $u(y)$, volume flow rate Q and the wall shear stresses τ_w.



Exercise 2：

A factory chimney height l=25m , diameter d=40cm, and environment temperature is 25^0C. Standard atmospheric pressur, the wind speed is respectively V_1=8 m/s ,V_2 = 20 m/s and V_3 = 200m/s. Under different wind speed, determine:

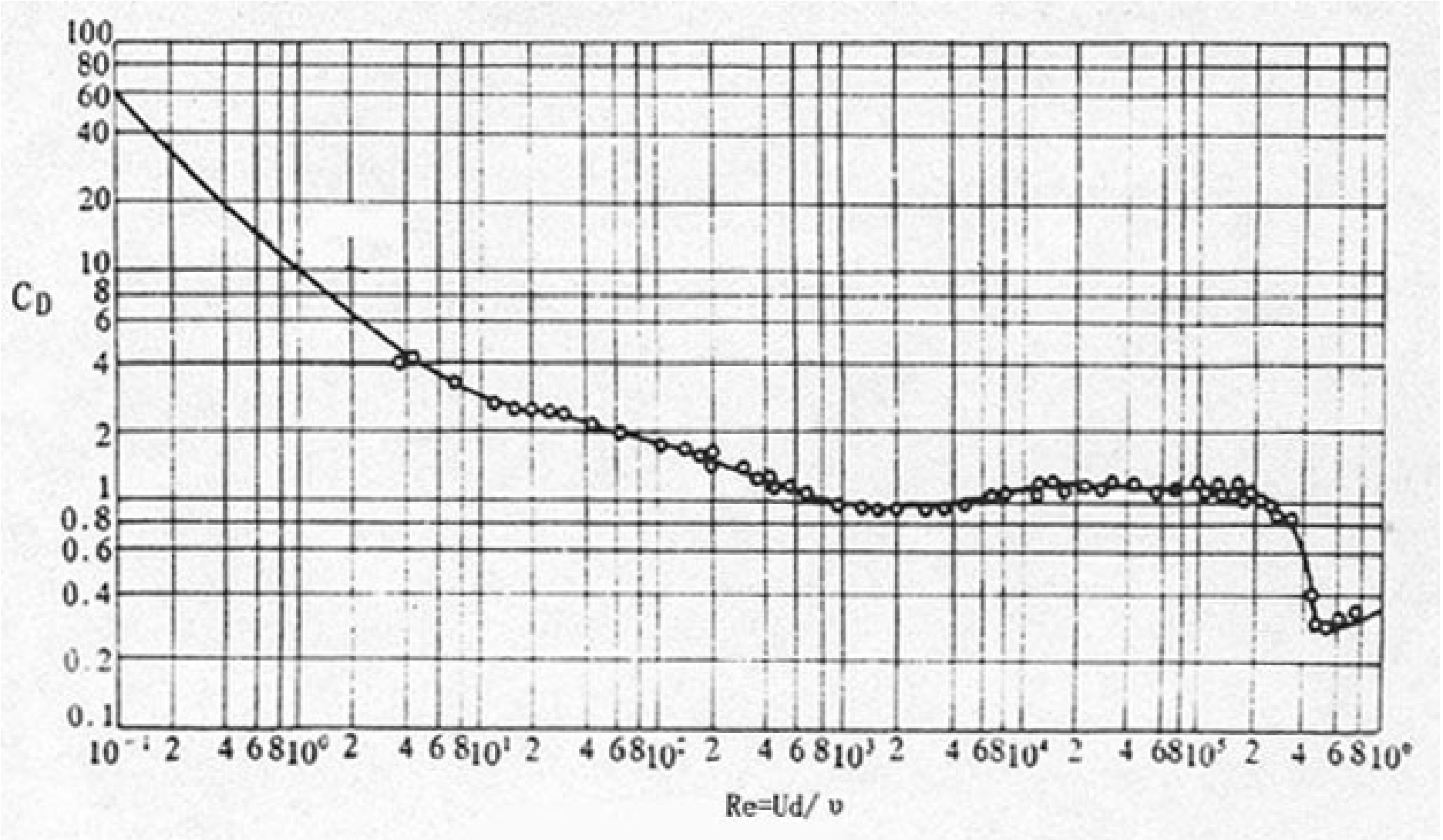
1. Drag coefficient C_D.

2. Drag F_D.

3. Torque M.

空气的物理性质（标准大气压）

温度	密度	动力粘度	运动粘度	比热比	声速
T/℃	ρ/kg/m^3	μ/N·s/m^2	υ/m^2/ s	γ	c/m/ s
-40	1.514	1.57E-5	1.04E-5	1.401	306.2
-20	1.395	1.63E-5	1.17 E-5	1.401	319.1
0	1.292	1.71E-5	1.32 E-5	1.401	331.4
5	1.269	1.73E-5	1.36 E-5	1.401	334.4
10	1.247	1.76E-5	1.41 E-5	1.401	337.4
15	1.225	1.80E-5	1.47 E-5	1.401	340.4
20	1.204	1.82E-5	1.51 E-5	1.401	343.3
25	1.184	1.85E-5	1.56 E-5	1.401	346.3
30	1.165	1.86E-5	1.60 E-5	1.400	349.1
40	1.127	1.87E-5	1.66 E-5	1.400	354.7
50	1.109	1.95E-5	1.76 E-5	1.400	360.3
60	1.060	1.97E-5	1.86 E-5	1.399	365.7
70	1.029	2.03E-5	1.97 E-5	1.399	371.2
80	0.9996	2.07E-5	2.07 E-5	1.399	376.6
90	0.9721	2.14E-5	2.20 E-5	1.398	381.7
100	0.9461	2.17E-5	2.29 E-5	1.397	386.9
200	0.7461	2.53E-5	3.39 E-5	1.390	434.5
300	0.6159	2.98E-5	4.84 E-5	1.379	476.3
400	0.5243	3.32E-5	6.43 E-5	1.368	514.1
500	0.4565	3.64E-5	7.97 E-5	1.357	548.8
1000	0.2772	5.04E-5	1.82 E-4	1.321	694.8



圆柱绕流阻力系数随 Re 数的变化