

## **PME 511000: Theory of Turbulent Flow (紊流理論)**

Spring, 2024

offered in English

Prerequisites: undergrad fluid dynamics, laminar flow theory

### **Instructor**

張敬 助理教授，email: [c.chang@pme.nthu.edu.tw](mailto:c.chang@pme.nthu.edu.tw)

Lecture: Tuesday 1:20 pm -4:20 pm

Location: 210 Engineering Building I

Office hours: Thursday 11 am -12 pm; or by appointment

My office: 516 Engineering Building I

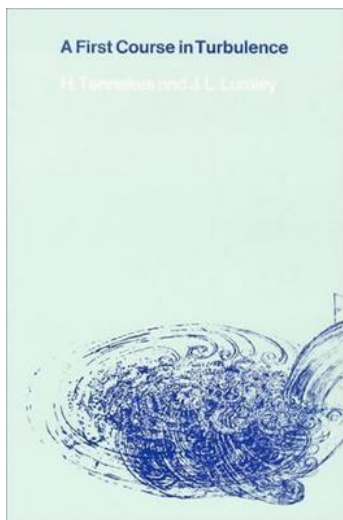
### **Teaching assistants**

TBD

TA emails: see course website on eclass

### **Textbook**

- Tennekes, H. and Lumley, J.L. *A first course in turbulence*. MIT Press (1972)



### **Reference**

- Pope, S.B. *Turbulent Flows*. Cambridge University Press (2000)
- Davidson, P.A. *Turbulence: An Introduction for Scientists and Engineers*. Oxford University Press (2004)
- Townsend, A.A. *The structure of turbulent shear flow*. Cambridge University Press (1976)
- Hinze, J.O. *Turbulence*. McGraw-Hill (1975)
- Libby, P.A. *An introduction to turbulence*. Taylor and Francis (1996)
- Batchelor, G.K. *The theory of homogeneous turbulence*. Cambridge University Press (1953)

## Syllabus

1. Introduction
2. Turbulent transport of momentum and heat
3. The dynamics of turbulence
4. Boundary free shear flows
5. Wall bounded shear flows
6. An introduction of turbulence modelling

## Grading policy

Homework 40%

Midterm 30%

Final 30%

## Provisional schedule

Week	Date	Textbook	Topic	Assignment
1	2/20	Chap 1	Introduction	
2	2/27	Chap 1		
3	3/5	Chap 1		
4	3/12	Chap 2	Turbulent transport of momentum and heat	

5	3/19	Chap 2		
6	3/26	Chap 2		
7	4/2	Chap 2		
8	4/9	Chap 3	The dynamics of turbulence	
9	4/16	Chap 3		
10	4/23	Chap 3		Midterm
11	4/30	Chap 4	Boundary free shear flows	
12	5/7	Chap 4		
13	5/14	Chap 4		
14	5/21	Chap 5	Wall bounded shear flows	
15	5/28	Chap 5		
16	6/4	Chap 5		
17	6/11	Chap 8 (Pope)	An introduction to modelling and simulation	
18				Final

Updated on Dec 20, 2023