

流体力学课程教学大纲

课程基本信息 (Course Information)					
课程代码 (Course Code)	PH330	学时 (Credit Hours)	48	学分 (Credits)	3
课程名称 (Course Name)	(中文) 流体力学				
	(英文) Fluid Mechanics				
课程性质 (Course Type)	物理学专业和物理学专业 (国际班) 选修课				
授课对象 (Audience)	物理学专业、物理学专业 (国际班) 大学三年级本科生				
授课语言 (Language of Instruction)	双语				
开课院系 (School)	物理与天文学院				
先修课程 (Prerequisite)	Mathematical Physics, Thermodynamics, Tensor calculus				
授课教师 (Teacher)		课程网址 (Course Webpage)			
*课程简介 (Description)	<p>The course is introductory - level Fluid Mechanics where I teach junior students the fundamental concepts for the physics of fluids. Ideal fluids will be given first where the basic equations such as the equation of continuity, Euler equation and Bernoulli's equation will be derived. Then the concepts of energy flux, momentum flux and potential flow will be given in details.</p> <p>Then we will start the study of Viscous Fluids in which the equations of motion (including the momentum flux tensor, stress tensor and Navier-Stokes equation), law of similarity and the importance of the Reynolds number will be derived in great details. Then we will study the Turbulence problems such as the stability of steady and rotary flows. In this chapter we will also study the theory of fully developed turbulence, the velocity correlation functions and Zhukovskii's theorem.</p> <p>Then we will study the flow in boundary layers (laminar and turbulent) and then we can drive the logarithmic velocity profile. Next we will study the thermal conduction in fluids where we will derive the general equation of heat transfer and the thermal conduction in incompressible fluid. Then we will study the thermal conduction in infinite and finite media. Next we will study the diffusion problem, where we will derive the equation of fluid dynamics for a mixture of fluids and then we will study the mass transfer and thermal diffusion. Then we are going to study the surface phenomena including the Laplace's formula and Capillary waves.</p> <p>Finally we will study the physics of Sound. Here we will derive the energy and momentum of sound waves and the reflection and refraction of sound waves. Then the propagation of sound waves in a moving medium.</p>				

课程教学大纲 (course syllabus)

<p>*学习目标 (Learning Outcomes)</p>	<p>1、掌握理想流体、非理性流体、流体中的输运现象、流体的表面现象等基础知识; 2、能应用基础知识解决相关问题; 3、课程结合学术前沿展开相关问题, 激发学生参与科研的兴趣。</p>					
<p>*教学内容、进度安排及要求 (Class Schedule & Requirements)</p>	<p>教学内容</p>	<p>学时</p>	<p>教学方式</p>	<p>作业及要求</p>	<p>基本要求</p>	<p>考查方式</p>
	<p>Fundamentals</p>	<p>5</p>		<p>Homework set 1</p>		
	<p>Ideal Fluids</p>	<p>5</p>		<p>Homework set 2</p>		
	<p>Viscous Fluids</p>	<p>8</p>		<p>Homework set 3</p>		
	<p>Turbulence</p>	<p>4</p>				
	<p>Boundary Layers</p>	<p>4</p>				
	<p>Thermal Conduction in Fluids</p>	<p>6</p>		<p>Homework set 4</p>		
	<p>Diffusion in Fluids</p>	<p>3</p>		<p>Homework set 5</p>		
	<p>Surface Phenomena in Fluids</p>	<p>3</p>				
	<p>Sound</p>	<p>8</p>		<p>Homework set 6</p>		
	<p>Introduction on Shock Waves</p>	<p>3</p>				
	<p>Final Exam</p>	<p>2</p>				
	<p>*考核方式 (Grading)</p>	<p>I assess students based on the following: 1. Activity in class 2. Assignments and homework 3. Attendance 4. Final exam results</p>				
<p>*教材或参考资料 (Textbooks & Other Materials)</p>	<p>1. Fluid Mechanics (2nd edition). Landau and Lifshitz Course of Theoretical Physics Volume 6 2. Tensor Calculus (Schaum's outlines). David C. Kay. Mac Graw Hill</p>					

其它 (More)	
备注 (Notes)	考核方式及考核方式中各项比例根据教学实践可能有所调整。