高等学校试用教材

港口及航道工程专业英语

朱梅心　编著

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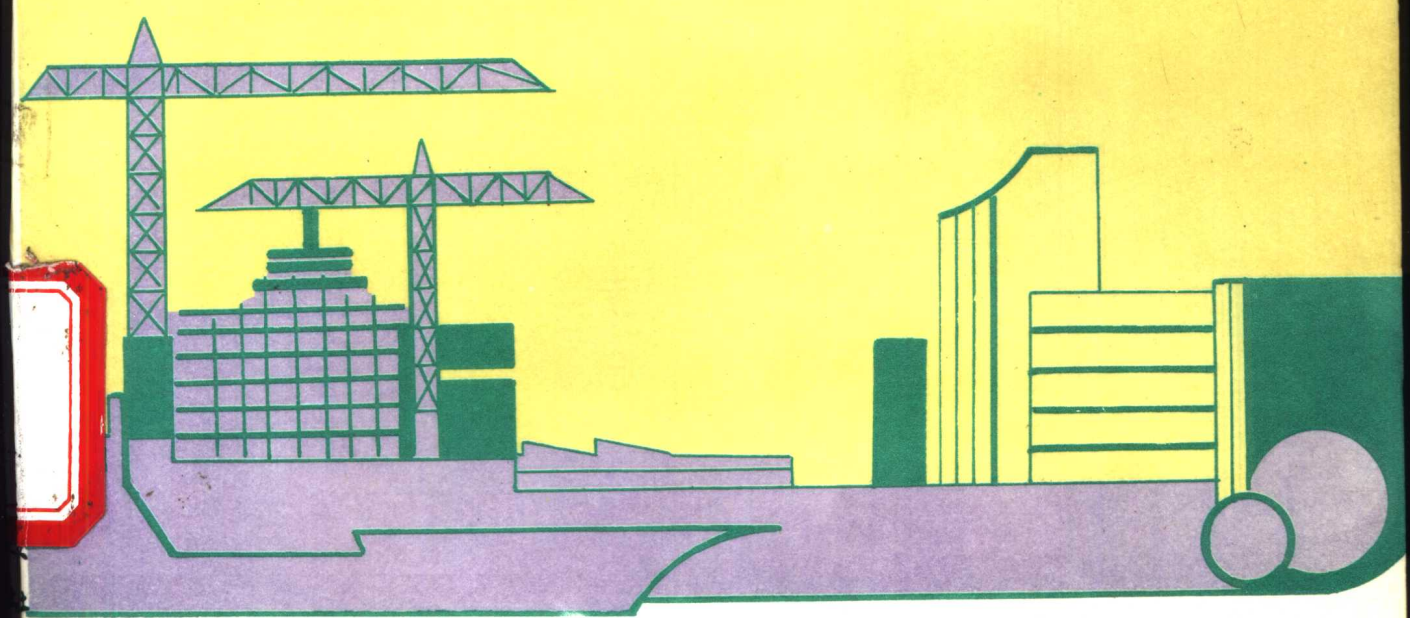

人民交通出版社

港口及航道工程专业英语

Professional English of Port & Channel Engineering

朱 梅 心 编著

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前　言

按国家教委规定，专业外语阅读应列为必修课而纳入教学计划。在加快改革开放的今天，其必要性更其明显。交通系统各专业均已出版有各自的专业英语教材，唯独尚无《港口及航道工程专业英语》。目前各校港航专业使用的专业英语教材有取材涵盖的面不宽或缺少港与航的核心内容等问题存在，确有编写的必要。为扩大管理和监理方面的词汇量，本书稿又增加了第四部分的四课课文。读者通过本书学习可达到顺利阅读专业书刊的要求。

译文及词条经刘光文教授逐字逐条反复审阅和修改，由顾家龙教授审稿，特此致谢。

由于编者水平有限，错误和不妥之处在所难免，恳请读者多加指正。

编　者

1993 年 3 月

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Section I Basic knowledge for Port & Channel Engineering

Lesson 1 Careers in Civil Engineering

Engineering is a profession, which means that an engineer must have a specialized university education. * Many government jurisdictions also have licensing procedures which require engineering graduates to pass an examination, similar to the bar examinations* for a lawyer, before they can actively start on their careers.

In the university, mathematics, physics, and chemistry are heavily emphasized throughout the engineering curriculum, but particularly in the first two or three years. Mathematics is very important in all branches of engineering, so it is greatly stressed. Today, mathema tics includes courses in statistics, which deals with gathering, classifying, and using numerical data, or pieces of information. An important aspect of statistical mathematics is probability, which deals with what may happen when there are different factors, or variables, that can change the results of a problem. Before the construction of a bridge is undertaken, for example, a statistical study is made of the amount of traffic* the bridge will be expected to handle. *

Because a great deal of calculation is involved in solving many problems, computer programming is now included in almost all engineering curricula. Computers, of course, can solve many problems involving calculations with greater speed and accuracy than a human being can. But computers are useless unless they are given clear and accurate instructions and information——in other words, a good program.

The last two years of an engineering program include subjects within the student's field of specialization. For the student who is preparing to become a civil engineer, these specialized courses may deal with such subjects as geodetic surveying, soil mechanics, or hydraulics.

The civil engineer may work in research, desgin, construction supervision, maintenance, or even in sales or management. Each of these areas involves different duties, different emphases, and different uses of the engineer's knowledge and experience.

Research is one of the most important aspects of scientific and engineering practice. A researcher usually works as a member of a team with other scientists and engineers. He or she is often employed in a laboratory that is financed by government or industry. Areas of research connected with civil engineering include soil mechanics and soil stabilization tech-

niques, and also the development and testing of new structural materials.

Careful study is given to each project even before design work begins. The study includes a survey both of topographical and subsoil features of the proposed site. It also includes a consideration of possible alternatives, such as a concrete gravity dam or an earth-fill embankment dam. The economic factors involved in each of the possible alternatives must also be weighed. Today, a study usually includes a consideration of the environmental impact of the project. Many engineers, usually working as a team that includes surveyors, specialists in soil mechanics, and experts in design and construction, are involved in making these feasibility studies.

Construction is a complicated process on almost all engineering projects. It involves scheduling the work and utilizing the equipment and the materials so that costs are kept as low as possible. Safety factors must also be taken into account, since construction can be very dangerous. Many civil engineers therefore specialize in the construction phase.

After the structure has been completed, it must be kept from falling into disrepair; therefore many engineers specialize in maintenance. This is often a function of the privately owned utility or governmental agency that will ultimately be responsible for the completed structure. A large system like the California State Water Project obviously requires a large maintenance staff under the supervision of qualified engineers.

Much of the work of civil engineers is carried on outdoors, often in rugged and difficult terrain or under dangerous conditions. In addition, the work must also progress under all kinds of weather conditions. The prospective civil engineer should be aware of the physical demands that will be made on him or her.

New Words and Expressions

1. Career 业务
2. civil engineering 土木工程
3. profession 专业
4. government jurisdiction 政府行政区
5. license 发许可证
6. bar examination 律师合格考试
7. mathematics 数学
8. physics 物理学
9. chemistry 化学
10. curriculum 全部课程
    （复 curricula ）
11. statistics 统计学
12. data 数据
13. information 资料，信息
14. probability 概率论
15. traffic 交通，运输
16. handle 处理，承受
17. computer programming 编制计算机程序
18. geodetic surveying 大地测量学
19. soil mechanics 土力学
20. hydraulics 水力学
21. research 研究
22. design 设计
23. construction 施工
24. supervision 管理，监督，监理
25. maintenance 维修
26. management 经营，管理
27. team 队，组

28. finance 资助
29. stabilization 稳定
30. structural material 建筑材料
31. project (n.)项目，计划，方案，工程设计
(v.)投影
32. survey 调查，勘查
33. topographical features 地形特征
34. subsoil 底土，基土，下层土
35. proposed site 预定的现场
36. alternatives 比较方案
37. earth-fill embankment dam 填土坝
38. concrete 混凝土
39. gravity dam 重力坝
40. environment 环境
41. surveyor 测量人员
42. feasibility 可行性
43. schedule 日程安排
44. disrepair 失修
45. privately owned utility 私营公用事业公司
46. be responsible for 对……负责
47. rugged 崎岖的
48. terrain 地带，地域
49. prospective 未来的

Notes

1. which means that...：这是个非限定性定语从句。关联词 which 代表的是前面整个主句 engineering is a profession.
2. bar：法庭中的围栏；法庭；律师的职业；律师界。
3. of the amount of traffic：这个介词短语作定语用，修饰 a statistical study，因为它比较长而谓语动词较短，为了使句子意义一目了然、句子结构匀称，所以将它移到谓语之后。
4. the bridge will be...：这是个定语从句，用以修饰 traffic，此处省略了关联词 which.
5. It also includes a consideration of...：it 代替上句中的 study.
6. fall into disrepair：失修，需要修理。
7. that will be made on him or her：是定语从句。用以修饰 physical demands.

Lesson 2 Hydrologic Cycle

"Hydrology treats of the waters of the Earth, their occurrence, circulation, and distribution, their chemical and physical properties, and their reaction with their environment, including their relation to living things. The domain of hydrology embraces the full life history of water on the Earth". Engineering hydrology includes those segments of the field pertinent to planning, design, and operation of engineering projects for the control and use of water. The boundaries between hydrology and other earth sciences such as meteorology, oceanography, and geology are indistinct, and no good purpose is served by attempting to define them rigidly. Likewise, the distinctions between engineering hydrology and other branches of applied hydrology are vague. Indeed, engineers owe much of their present knowledge of hydrology to agriculturists, foresters, meteorologists, geologists, and others in a variety of

fields.

The concept of the hydrologic cycle is a useful, if academic, point from which to begin the study of hydrology. This cycle is visualized as beginning with the evaporation of water from the oceans. The resulting vapor is transported by moving air masses. Under the proper conditions, the vapor' is condensed to form clouds, which in turn may result in precipitation. ' The precipitation which falls upon land' is dispersed in several ways. The greater part is temporarily retained in the soil near where it falls' and is ultimately returned to the atmosphere by evaporation and transpiration by plants. A portion of the water find its way over and through the surface soil to stream channels, while other water penetrates farther into the ground to become part of the groundwater. Under the influence of gravity, both surface streamflow and groundwater move toward lower elevations and may eventually discharge into the ocean. However, substantial quantities of surface and underground water are returned to the atmosphere by evaporation and transpiration before reaching the oceans.

The discussion of the hydrologic cycle should not give an impression of a continuous mechanism through which water moves steadily at a constant rate. The movement of water through the cycle is erratic, both in time and over area. On occasion, nature provides torrential rains which tax surface-channel capacities to the utmost. At other times it seems that the machinery of the cycle has stopped completely and, with it, precipitation and streamflow. In adjacent areas the variations in the cycle may be quite different. It is precisely these extremes of flood and drought that are of most interest to the engineering hydrologist, for hydraulic engineering projects are designed to protect against the ill effect of extremes. The reasons for these climatic extremes are found in the science of meteorology and should be understood, in broad detail at least, by the hydrologist.

Hydrologists are interested in more than obtaining a qualitative understanding of the hydrologic cycle and measuring the quantities of water in transit in this cycle. They must be able to deal quantitatively with the interrelations between factors so that they can predict the influence of human activities on these relationships. They must concern themselves with the frequency with which extremes of the cycle may occur, for this is the basis of economic analysis, an important determinant for all hydraulic projects.

New Words and Expressions

1. hydrologic cycle 水文循环
2. hydrology 水文学
3. treat of 探讨
4. occurrence 存在
5. circulation 循环
6. distribution 分布
7. domain 范围,领域
8. embrace 包括
9. segment 部分
10. pertinent to 有关
11. planning 规划
12. operation 运营,操作,经营
13. earth science 地球科学
14. meteorology 气象学

15. oceanography 海洋学
16. geology 地质学
17. *no good purpose* 无必要
18. rigid 严格的
19. vague 模糊的
20. owe much of... to 归功于
21. in a variety of 种种
22. visualize 设想，想象
23. evaporation 蒸发
24. air mass 气团
25. condense 冷凝
26. in turn 从而，又
27. result in 导致
28. precipitation 降水
29. disperse 分散，扩散
30. temporarily 暂时地
31. retain 保留，保持
32. ultimately 最终地
33. transpiration 散发
34. surface soil 表土
35. find its way... to(或 into)到达，设法到达
36. stream 溪流，河道
37. channel 槽，渠，水道，航道
38. penetrate 渗透
39. groundwater 地下水
40. eventually 最终地
41. substantial 大量的
42. constant 不变的，常数
43. steady 恒定的
44. erratic 不稳定的
45. on occasion 有时
46. torrential rain 骤雨
47. tax 受压
48. with it 相随
49. adjacent 邻近的
50. extremes 极值，极端情况
51. flood 洪水
52. drought 干旱
53. of interest to 对感兴趣
54. hydraulic engineering project（或 hydraulic project）水利工程
55. ill effect 恶果
56. broad detail 概括性的
57. in transit 在运输中
58. predict 预测
59. concern themselves with 关心
60. determinant 决定因素

Notes

1. for the control and use of water：介词短语作定语，修饰 engineering projects.
2. resulting：系分词作定语，修饰 vapor.
3. which in turn may result in precipitation：为非限制性定语从句，修饰 clouds.
4. which falls upon land：为限制性定语从句，修饰 precipitation.
5. near where it falls：定语从句，修饰 soil.
6. for hydraulic engineering projects are designed to protect against the ill effect of extremes：为原因状语从句。

Lesson 3 The Grand Canyon

The canyons of America's southwest are deep, ancient openings in the Earth. They look

as if they formed as * the Earth split apart. But the canyons did not split. They were cut by rivers. The rivers carried dirt and tiny pieces of stone that slowly ate away at the surrounding rock. For millions of years, the rivers turned and pushed, cutting deeper and deeper into the Earth. * In their paths, they left great rocky divides in the Earth that extend for hundreds of kilometers.

A canyon is almost the opposite of a mountain. Narrow at the bottom; wider at the top. It is as if a mountain were turned over, pushed into the Earth, and removed. Only its form remains. The Grand Canyon in Arizona is one of the largest and most beautiful of all canyons. It extends 450 kilometers.

When you come upon the canyon, walls of rock fall away sharply at your feet. In some places, the canyon walls are more than a kilometer deep. Far below is the dark, twisting line of the Colorado River.

On the other side, sunshine lights up the naked rock walls in colors of red, orange and gold. The bright colors of the canyon's walls are the result of minerals in the rocks. Their appearance changes endlessly... with the light, the time of year, and the weather. At sunset, when the sun has moved across the sky, the canyon walls give up their reds and golds. They take on quieter colors of blue, purple and green.

Hundreds of rocky points rise from the bottom of the canyon. Some are very tall. Yet they are all below the level of an obsrever on the edge, looking over. *

Looking at the Grand Canyon is like looking back in time. Forty-million years ago, the Colorado River began cutting through the area. * At the same time, the surrounding land was being pushed up by forces deep within the Earth. Rain, snow, ice, wind and plant growth rubbed away at the top of the new canyon. And below, the flowing river continued to uncover more and more levels of ancient rock. Some of Earth's oldest rocks are seen here. Level upon level of granites, schists, limestones and sandstones.

The Canyon has several different weather environments. The top is often much different from the bottom. On some winter days, for example, you may find cold winds and snow at the top. But at the bottom, you may find warm winds and flowers.

The Indians left no records of their knowledge of the Grand Canyon. Much of what we know today was recorded by John Wesley Powell. In 1869, he became the first white American to explore much of the Canyon. Powell and his group traveled in four boats. They knew very little about getting over the rapid, rocky water of the Colorado River. In many areas of fast-flowing water, a boat could be turned over by a wave as high as a house. Powell and his group spent more than three months on the river. They soon lost some of their food and equipment. At one especially dangerous rapids, three members of the group left. As they walked up and out of the Canyon, they were murdered by Indians. The rest of Powell's group was lucky to survive. Starving and tired, they finally reached the end of the Canyon.

Powell's reports and maps from the trip made him famous and greatly increased interest in the Grand Canyon. But visitors did not begin to go to the Canyon in large numbers until 1901. That was when a railroad reached the area.

Today, the Grand Canyon is known as one of the seven wonders of the natural world. In 1989, almost four-million people visited the Canyon. Many were from other countries. Most visitors walk part way down into the Canyon along small, steep paths. It takes several hours to walk to the bottom. It takes two times as long to get back up. Some visitors ride mules to the bottom and back.

About 30,000 people see the Canyon by air each year. They pay a helicopter or airplane pilot to fly them above and around the Canyon. About 17,000 people a year see the Grand Canyon from the Colorado itself. They ride air-filled rafts of other boats over the rapid, rocky water. These trips last from one to three weeks.

America's National Park Service is responsible for protecting the Grand Canyon from the effects of so many visitors. All waste material must be carried out of the Canyon. All rocks, historical objects, plants and wildlife must be left untouched. As the National Park Service tells visitors:"Take only photographs. Leave only footprints."

Many writers have tried to describe the wonder of the Grand Canyon. Yet writers re cognize that it is impossible to put human meaning in such a place. * Writer and scientist Larry Stevens says the almost overpowering silence and deepness of the Canyon shakes people-at least briefly-out of their self-importance. He says it makes us remember our place in the nature world.

New Words and Expressions

1. canyon 峡谷
2. ancient 古代的
3. split 裂开
4. dirt 泥土
5. tiny 微小的
6. twisting 曲折的
7. naked 裸露的
8. mineral 矿物
9. appearance 外观
10. purple 紫色
11. rocky point 石笋
12. granite 花岗岩
13. schist 片岩
14. limestone 灰岩,石灰石
15. sandstone 砂岩
16. explore 勘探,探险
17. rapids 急流,急滩
18. survive 幸存
19. mule 骡
20. helicopter 直升飞机
21. raft 筏
22. overpower 压倒,制服

Notes

1. look as if:看着象是,they formed 为表语从句,后面的 as 表示原因。
2. cutting deeper and deeper into the Earth: 为分词短语作状语,deeper and deeper 和 into the Earth 又都是修饰 cutting 的状语。

3. looking over：为分词作状语，修饰 an observer.

4. cutting through the area：为 began 的宾语，cutting 为动名词。

5. that it is impossible to put human meaning in such a place：为宾语从句，it 为引导词，动词不定式 to put 才是真正的主语。

Lesson 4 River

River is a large natural stream of fresh water that flows across land in a definite channel for all or part of the year. Rivers range widely in their physical characteristics from narrow, roaring mountain torrents to vast expanses of silently gliding water. The integral part rivers have played in the development of civilization is undisputed. *

Rivers always have transportation routes, both on the water and along the adjacent banks. Rivers are also suppliers of water and energy, and waste carriers for man and nature. Through their flood deposits they have provided fertile level land. The land supplies much of the world's food, often with the aid of irrigation from the stored floodwaters. For these reasons, in spite of repeated catastrophic floods, river valleys have been cradles of civilization and routes of exploration throughout time.

Supplying water is probably the most important economic role of rivers. Water, a renewable resource, is both the least expensive and most essential commodity-except for air-that man uses. As is the usual case where cost is not a major consideration, water is often used carelessly. * The Cuyahoga River at Cleveland, Ohio (USA), for example, actually caught fire because of the quantity of hydrocarbon wastes dumped in it. Such visible pollution is not as frightening as the other industrial wastes that may become even more toxic when chlorine is added at a water treatment facility downstream.

In the developed nations major efforts are being made to clean up sewage and industrial wastewater before it is discharged into rivers and streams so that the water may be used again downstream. Farming and mining practices are being modified to yield less sediment and fewer pollutants. As a result of these efforts, many streams are running cleaner than they have since about 1930.

The rich, irrigated farmlands of river floodplains, terraces, and alluvial fans in such countries as Egypt, Pakistan, China, India, and Mexico and in the southwestern United States are essential to feeding a major part of the world's people. One indicator of the value of a river's contribution to fertile soil is the increased need for artificial fertilizer for Egyptian fields no longer enriched each year by the floods of the Nile. Perhaps the extreme example of a people adjusted to living with a river is the tens of thousands of people who take to boats each year during the floods of the Ganges-Brahmaputra in Bangladesh. As the newly formed bars in the river become islands during the recession of the floodwaters, the new land is planted with a crop. The tops of the bars are said to be green with crops before the flood is over.

New Words and Expressions

1. fresh water 淡水
2. characteristic 特征
3. roar 吼叫，呼啸
4. mountain torrent 山洪，山溪，荒溪
5. vast expanse 广阔水域
6. glide 滑动，滑行
7. integral 组成的
8. civilization 文明，文化
9. undisputed 毫无疑问
10. route 线路，航路
11. supplier 供应者
12. deposits 沉积物
13. irrigation 灌溉
14. in spite of 尽管，不管
15. catastrophic 灾害性的
16. river valley 河谷
17. cradle 摇篮，发源地
18. exploration 探险
19. renewable resource 可更新资源
20. commodity 商品
21. catch fire 着火
22. hydrocarbon 碳氢化合物
23. dump 倾倒
24. visible 可见的
25. pollution 污染物
26. frighten 可怕
27. toxic 有毒的
28. chlorine 氯
29. water treatment facility 净水处理厂
30. sewage 污水
31. discharge 泄放，排放
32. modify 更改
33. sediment 沉积物，泥沙
34. pollutant 污染物
35. as a result of 作为……的结果
36. irrigated farmland 灌溉农田，水田
37. floodplain 滩地
38. terrace 阶地
39. alluvial fan 冲积扇
40. indicator 指示物，指标
41. fertile 肥沃的
42. fertilizer 肥料
43. adjust to 适应……
44. bar 沙洲
45. recession 消退
46. crop 庄稼，作物

Notes

As is the usual case where cost is not a major consideration：是由关系代词 as 引出的非限制性定语从句，修饰整个主句；as 在从句中作主语。从句中又含有一个由 where 引出的同位语从句，其语法功能相当于定语从句。

Lesson 5 Properties of Fluids

1. Density, Specific weight, and Specific gravity

The density ρ of a fluid is its mass per unit volume. In the international system of units

(SI units), density ρ will be in kg/m^3, which may also be expressed as units of N · s^2/m^4. *

Specific weight γ represents the force exerted by gravity on a unit volume of fluid and therefore must have the units of force per unit volume, such as N/m^3.

Density and specific weight of a fluid are related as follows:

$$\rho = \frac{\gamma}{g} \quad \text{or} \quad \gamma = \rho g$$

Since the physical equations are dimensionally homogeneous, the dimensions of density are

$$\frac{dimensions\ of\ \gamma}{dimensions\ of\ g} = \frac{\mathrm{N/m^3}}{\mathrm{m/s^2}} = \frac{dimensions\ of\ mass}{dimensions\ of\ volume} = \frac{\mathrm{kg}}{\mathrm{m^3}}$$

It should be noted that density ρ is absolute * since it depends on mass which is independent of location. Specific weight γ, on the other hand, is not absolute for it depends on the value of the gravitational acceleration g which varies with location, primarily latitude and elevation above mean sea level.

Specific gravity s of a liquid is the ratio of its density to that of pure water at a standard temperature. In the metric system the density of water at 4 C is 1.0 g/cm^3, equivalent to 1000kg/m^3, and hence the specific gravity(which is dimensionless) has the same numerical value for a liquid in that system as its density expressed in g/cm^3 or in Mg/m^3.

2. Viscosity

The viscosity of a fluid is a measure of its resistance to shear or angular deformation. The friction forces in fluid flow result from the cohesion and momentum interchange between molecules in the fluid. As the temperature increases, the viscosities of all liquids decrease, while the viscosities of all gases increase. This is because the force of cohesion, which diminishes with temperature, predominates with liquids, while with gases the predominating factor is the interchange of molecules between the layers of different velocities. Thus a rapidly moving molecule shifting into a slower-moving layer tends to speed up the latter. And a slow-moving molecule entering a faster-moving layer tends to slow it down. This molecular interchange sets up a shear, or produces a friction force between adjacent layers. Increased molecular activity * at higher temperatures causes the viscosity of gases to increase with temperature.

Consider two parallel plates(Fig. 5.1), sufficiently large so that edge conditions may be neglected *, placed a small distance Y apart, the space between being filled with the fluid. The lower surface is assumed to be stationary, while the upper is moved parallel to it with a velocity U by the application of a force F corresponding to some area A of the moving plate.

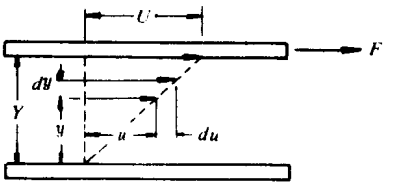

Fig. 5.1

Particles of the fluid in contact with each plate will adhere to it, and if the distance Y is

not too great or the velocity U too high, the velocity distribution will be a straight line, and the velocity gradient is a constant.

$$F \sim \frac{AU}{Y}$$

It may be seen from similar triangles in Fig. 5.1 that U/Y can be replaced by the velocity gradient du/dy. If a constant of proportionality μ is now introduced, the shearing stress τ between any two thin sheets of fluid may be expressed by

$$\tau = \frac{F}{A} = \mu \frac{U}{Y} = \mu \frac{du}{dy} \tag{5-1}$$

Equation (5-1) is called Newton's equation of viscosity, and in transposed form* it serves to define the proportionality constant

$$\mu = \frac{\tau}{du/dy}$$

which is called the coefficient of viscosity, the absolute viscosity, the dynamic viscosity (since it involves force), or simply the viscosity of the fluid.

An ideal fluid may be defined as one in which there is no friction, that is, its viscosity is zero. Thus the internal forces at any internal section are always normal to the section, even during motion. Hence the forces are purely pressure forces. Such a fluid does not exist in reality.

The dimensions of absolute viscosity are force per unit area divided by velocity gradient. In SI system the dimensions of absolute viscosity are as follows:

$$\text{Dimensions of } \mu = \frac{\text{N/m}^2}{\text{s}^{-1}} = \frac{\text{N} \cdot \text{s}}{\text{m}^2}$$

In many problems involving viscosity there frequently appears the value of viscosity divided by density. This is defined as kinematic viscosity υ, so called because force is not involved, the only dimensions being length and time, as in kinematics. Thus

$$\upsilon = \frac{\mu}{\rho}$$

In the metric system the units of υ are cm^2/s.

New Words and Expressions

1. property 特性
2. fluid 流体
3. density 密度
4. specific weight 重度(容重)
5. specific gravity 相对密度
6. system of units 单位制
7. homogeneous 一致的
8. dimension 量纲,维
9. latitude 纬度
10. elevation 高程
11. mean sea level 平均海平面
12. metric system 米制
13. equivalent 相当于
14. Mg=megagram 10^6 克
15. viscosity 粘滞性,粘度
16. measure 量度