

物理专业英语文选

上册

南京大学外文系公共英语教研室编

商务印书馆

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前 言

在实现科学技术现代化的伟大斗争中，外语是广大群众迫切需要掌握的工具之一。本书就是为了适应这种形势，帮助有关人员提高阅读物理专业英语书刊的能力而编写的。

全书分上下两册，各有三十课。上册以物理学各科的基础知识为主，下册以固体物理学各专业知识为主。适合有大学二年英语基础的物理系学生及有相当英语程度的物理科学工作者做自修读本用。

本书各课编排尽量做到循序渐进，由浅入深，由短而长。每课除正文外，还有词汇、词组和注释，便于读者自学，并有助于掌握和巩固学过的词汇和语法。此外，书末附有课文译文，以便于读者在理解原文遇到困难或把握不大时翻阅参考。

本书材料多半选自英、美新近出版的物理学方面的书刊。选材内容较新，范围较广，词汇比较全面，语法和文体也比较多样。读完这本文选，大致可以比较顺利地阅读一般物理专业的英语书刊。

本书由徐丽卿、高荫蓉编写。在编写过程中，我校物理系许多教师在选材、校对课文译稿方面做了不少工作，特在此表示衷心感谢。

由于编者的专业知识和语言水平的限制，本书一定还存

在不少缺点和错误，欢迎广大读者提出宝贵意见。

南京大学外文系公共英语教研室

本书所用语法略语表

- a.* adjective 形容词
- ad.* adverb 副词
- conj.* conjunction 连词
- n.* noun 名词
 - pl.* plural 复数
 - sing.* singular 单数
- prep.* preposition 介词
- pron.* pronoun 代词
- vi.* intransitive verb 不及物动词
- vt.* transitive verb 及物动词

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1. MATTER AND VOLUME

Matter is the name given to everything which has weight and occupies space.^① It may usually be detected by the sense of touch, sight or smell.

Matter may exist in three states: solid, liquid and gas. All substances, except those which decompose when heated,^② may be changed from one state into another. A substance in the solid state may be changed into a liquid substance, and one in the liquid state may be changed into a gaseous substance. Changes can take place in the reverse order as well: gases may be changed into liquids and liquids into solids. A solid substance such as ice may be changed into the liquid state, or liquefied, to become water;^③ and this may be changed into the gaseous state, or evaporated, to become steam.

Steam may also be converted into water and water into ice.

All matter occupies space. The space occupied by a quantity of matter is called its volume,^④ and it is usually measured in units such as cubic metres or cubic centimetres. Solids have a definite volume and shape, liquids have a definite volume but no shape; the latter take on the shape of the container in which they rest.^⑤ Gases have no definite volume and no shape.

词 汇

matter ['mætə] *n.* 物质
volume ['vɒljum] *n.* 体积
give [gɪv] (gave, given, giving) *vt.*

给
weight [weɪt] *n.* 重量
occupy ['ɒkjʊpaɪ] *vt.* 占有

space [speɪs] *n.* 空间
usually ['ju:ʒuəli] *ad.* 通常
detect [di'tekt] *vt.* 发觉; 探测
sense [sens] *n.* 感觉
touch [tʌtʃ] *n.* 接触; 碰; 摸
sight [saɪt] *n.* 视力
smell [smel] (smelt [smelt], smelt)
v., n. 嗅; 闻
exist [ɪg'zɪst] *vi.* 存在
state [steɪt] *n.* 状态
solid ['sɒlɪd] *n.* 固体
liquid ['lɪkwɪd] *n.* 液体
gas [gæs] *n.* 气体
substance ['sʌbstəns] *n.* 物质
except [ɪk'sept] *prep.* 除...以外
decompose [,di:kəm'pəuz] *vi.* 分解
heat [hi:t] *vt.* 加热
another [ə'nʌðə] *pron.* 另一个
gaseous ['geɪzjəs] *a.* 气体的, 气态

的
liquefy ['likwɪfaɪ] *vt.* 溶解; 使液化
evaporate [ɪ'væpəreɪt] *vt.* (使) 蒸发; (使) 汽化
steam [sti:m] *n.* 汽; 蒸汽
ice [aɪs] *n.* 冰
quantity ['kwɒntəti] *n.* 量
measure ['meʒə] *vt.* 计量, 测量
cubic ['kju:bɪk] *a.* 立方的
metre ['mi:tə] *n.* 米; 公尺
centimetre ['sentɪmɪ:tə] *n.* 公分; 厘米
definite ['defɪnɪt] *a.* 明确的; 一定的
 的
shape [ʃeɪp] *n.* 形状
latter ['lætə] *a.* 后面的
container [kən'teɪnə] *n.* 容器
rest [rest] *vi.* 安放

词 组

(to) change ... into (to) 由...变为...
(to) take place 发生
in the reverse order 以相反的顺序
as well 也, 又
such as 例如, 象

(to) convert ... into 把...转变成...
in units 以单位(量度)
the latter 后者
(to) take on 取, 呈现

注 释

- ① Matter is the name given to everything which has weight and occupies space. 这是一句主从复合句。which ... space 为定语从句, 修饰先行词 everything; 主句中的 given to everything 为过去分词短语, 修饰 name。
- ② except those which decompose when heated: 这是一个介词短语, those 作 except 的宾语; which decompose 为定语从句, 修饰 those; when heated (when they are heated) 为状语从句, 修饰 decompose; when heated 也可以理解为过去分词前面加上了一个从属连词, 作状语。

- ③ A solid substance such as ice may be changed into the liquid state, or liquefied, to become water. 这是整个并列复合句中的第一个分句, a solid substance 为主语; such as 的意思是“象...一样”或“如...”; may be changed or (may be) liquefied 为谓语部分, 用的是被动语态; to become water 为动词不定式, 作状语, 表示结果。
- ④ The space occupied by a quantity of matter is called its volume. 本句的主语为 the space; occupied by ... matter 为过去分词短语, 作定语, 修饰 space; is called 为被动语态; its volume 为主语补足语。
- ⑤ the latter take on the shape of the container in which they rest: 这是整个句子中的第三个分句, 其中 the latter 为主语, 指的是 liquids, the latter 可以代单数名词, 也可以代复数名词, 词形没有变化, (不用加“s”), 但动词要随单复数变化; 动词短语 take on 的意思是“呈... (形状)”, “取... (形状)”; in which they rest 为定语从句, 修饰 container。

2. SOUND MAY ECHO

An echo is produced when sound waves strike a surface and bounce back. Sound is ordinarily absorbed and changed to heat by most objects. But a hard wall or cliff will produce an echo. Outdoors an echo is often amusing, but indoors it will cause you to hear the same sound more than once, usually mixed with other sounds, and it will be irritating and confusing.①

In order to prevent echoes, walls and ceilings are lined with soft drapes, porous (full of holes or spaces) wall boards, or other materials which absorb the energy of sound.② Broadcasting studios are always prepared in this way.

Loudness of sound may be measured. There is a device for measuring the loudness of sound. It gives a reading on a dial in the number of sound units, called decibels, indicating the loudness of the sound.③ This device is useful in locating unwanted noises in schools, factories, and on the street.

A form of the same device is used to measure the faintest sound that a person can hear in order to measure his hearing ability.④ If one cannot hear as well as other people, he knows as a result of this test what his hearing ability is.⑤ It is possible today to have hearing aids which help greatly in overcoming loss of hearing.⑥

词 汇

• sound [saund] *n.* 声音 ·
• echo [ˈekəʊ] *vt., n.* 回声 ·
• wave [weɪv] *n.* 波

strike [straɪk] (struck [strʌk],
struck) *vt.* 打击
• surface [ˈsɜːfɪs] *n.* 表面

bounce [baʊns] *vi.* 反弹; 跳跃
back [bæk] *ad.* 回; 回原处(或原状)
ordinarily ['ɔ:dinərili] *ad.* 普通, 通常
absorb [əb'sɔ:b] *vt.* 吸收
object ['ɒbdʒɪkt] *n.* 物体
hard [hɑ:d] *a.* 硬; 坚实的
cliff [klɪf] *n.* 悬崖, 峭壁
outdoors ['aʊt'dɔ:z] *ad.* 在户外; 在野外
indoors [in'dɔ:z] *ad.* 在屋里
amusing [ə'mju:ziŋ] *a.* 引起乐趣的
cause [kɔ:z] *vt.* 引起
same [seɪm] *a.* 同样的; 同一的
once [wʌns] *n.* 一次
mix [mɪks] *vi.* 混合
irritating ['ɪrɪteɪtɪŋ] *a.* 使人不愉快的
confusing [kən'fju:zɪŋ] *a.* 使慌乱的
line [laɪn] *v.* 以...衬里; 贴上
prevent [prɪ'vent] *vt.* 防止, 使免于
ceiling ['si:lɪŋ] *n.* 天花板
soft [sɒft] *a.* 软的
drape [dreɪp] *n.* [常用复] 窗帘
porous ['pɔ:rəs] *a.* 多孔的
full [fʊl] *a.* 充满的
hole [həʊl] *n.* 孔; 洞; 空穴

board [bɔ:d] *n.* 板
material [mə'tɪəriəl] *n.* 材料; 原料; 物质
energy ['enədʒi] *n.* 能(量)
broadcasting ['brɔ:dkɑ:stɪŋ] *n., a.* 广播(的)
studio ['stju:diəʊ] *n.* 播音室
prepare [prɪ'peə] *vt.* 准备
loudness ['laʊdnɪs] *n.* 响度; 音量
device [dɪ'vaɪs] *n.* 装置; 器件
reading ['ri:diŋ] *n.* 读数
dial [daɪəl] *n.* 度盘; 刻度盘
decibel ['desɪbl] *n.* 分贝
indicate ['ɪndɪkeɪt] *vt.* 指出; 表明
locate [ləu'keɪt] *vt.* 定位; 找出
unwanted [ˌʌn'wɒntɪd] *a.* 不需要的
noise [nɔɪz] *n.* 噪音
form [fɔ:m] *n.* 类型
faint [feɪnt] *a.* 微弱的
person ['pɜ:sn] *n.* 人
ability [ə'bɪləti] *n.* 能力
test [test] *n.* 试验
possible ['pɒsəbəl] *a.* 可能的
aid [eɪd] *n.* 辅助装置
overcome [ˌəʊvə'kʌm] (overcame [ˌəʊvə'keɪm], overcome) *vt.* 克服
loss [lɒs] *n.* 损失; 衰减

词 组

(to) bounce back 弹回来
more than once 不止一次
(to) be mixed with 搀有...的
in order to 为了
(to) be lined with 以...衬里

full of 充满...的
in this way 这样
as ... as 象...一样...
as a result (of) 由于...的结果

注 释

① Outdoors an echo is often amusing, but indoors it will cause you

to hear the same sound more than once, usually mixed with other sounds, and it will be irritating and confusing. 这是一句并列复合句, 由三个分句组成。第一、二分句中的 outdoors 和 indoors 均为副词作状语; 在第二分句中, it 指的是 echo, to hear the same sound more than once 为不定式短语, 作宾语补足语; mixed with other sounds 为过去分词短语, 修饰前面的 sound; usually 说明 mixed; 在第三分句中 irritating 和 confusing 为现在分词, 作表语。

- ② In order to prevent echoes, walls and ceilings are lined with soft drapes, porous (full of holes or spaces) wall boards, or other materials which absorb the energy of sound. 这是一句主从复合句。in order to prevent echoes 为介词短语, 作目的状语, 介词 with 与后面的三个宾语 drapes, wall boards 和 materials 一起构成介词短语, 作状语, 修饰 are lined; which absorb the energy of sound 为定语从句, 修饰 materials。
- ③ in the number of sound units, called decibels, indicating the loudness of the sound: in the number of sound units 为介词短语, 作状语, 说明以什么方式给出读数; called decibels 为过去分词短语, 修饰 units; indicating ... of the sound 为现在分词短语, 作状语, 表示标出读数的结果。
- ④ to measure the faintest sound that a person can hear in order to measure his hearing ability: to measure the faintest sound 为不定式短语, 作状语, 修饰 is used; that a person can hear 为定语从句, 修饰 sound; in order to ... ability 为介词短语, 作状语, 修饰前面一个 to measure。
- ⑤ If one cannot hear as well as other people, he knows as a result of this test what his hearing ability is. 这是一句主从复合句。he knows...ability is 为主句; as a result of this test 中 as 为介词, 整个介词短语作原因状语, 说明 knows; 名词从句 what his hearing ability is 作 knows 的宾语; if one ... other people 为条件状语从句, 其中 as well as 的意思是“与...一样好”。
- ⑥ It is possible today to have hearing aids which help greatly in overcoming loss of hearing. 这一句中的 it 为先行代词, 不定式 to have hearing aids 为真正的主语; which help ... loss of hearing 为定语从句, 修饰 hearing aids; in overcoming loss of hearing 为介词短语, 作状语, 说明 help; 这一句中的两个 hearing 和 overcoming 均为动名词, 其中第一个 hearing 用作定语, 修饰 aids, 意思是 the aids which can help people hear。

3. NEWTON'S LAWS OF MOTION

Dynamics is one of the most essential foundations of physics. This subject was first soundly established in the 17th century on the basis of the axiom usually known as Newton's laws of motion.^① Although certain modifications are now known to be necessary for the precise formulation of dynamics in accordance with modern developments,^② these laws are sufficiently exact for nearly all applications. A clear understanding of Newtonian dynamics is of the first importance^③ to every student of science and engineering.

First Law — A body at rest remains at rest, and a body in motion moves with uniform speed in a straight line, unless a force acts on it.

Second Law — The rate of change of momentum of a body is proportional to the impressed force and takes place in the direction of that force. By suitable choice of units one may say that the rate of change of momentum is equal to the force.^④

Third Law — If a force acts on a body then an equal and opposite force must act upon another body.

In these laws 'force' means the resultant of all externally applied forces. Momentum is the product of mass times velocity, thus for a body of constant mass, rate of change of momentum is equal to mass times acceleration. Force is often wrongly defined as mass times acceleration. As mass can vary in several circumstances this is unsound and misleading.^⑤

These laws are fundamentally linked with the law of gravita-

tion. The planets and satellites are the most familiar objects whose motions can be studied with precision. They do not move in straight lines with uniform speed, hence if we accept the first law we must suppose that they are acted upon by those forces which we call gravitational.⑥

词 汇

- Newton** ['nju:tn] *n.* 牛顿(人名)
- law** [lə:] *n.* 定律
- motion** ['məʊʃən] *n.* 运动
- dynamics** [dai'næmiks] *n.* 动力学
- essential** [i'senʃəl] *a.* 本质的; 重要的
- foundation** [faun'deɪʃən] *n.* 基础
- soundly** ['saʊndli] *ad.* 完好地; 坚固地
- establish** [is'tæblɪʃ] *vt.* 建立
- century** ['sentʃuri] *n.* 百年; 世纪
- axiom** ['æksiəm] *n.* 公理; 原则
- although** [ɔ:l'ðəʊ] *conj.* 虽然; 即使
- certain** ['sɜ:tn] *a.* 某些
- modification** [ˌmɒdifi'keɪʃən] *n.* 修改
- formulation** [ˌfɔ:mju'leɪʃn] *n.* 系统阐述; 明确表达
- modern** ['mɒdən] *a.* 现代的
- development** [di'veləpmənt] *n.* 发展
- sufficiently** [sə'fɪʃəntli] *ad.* 足够地
- exact** [ɪg'zækt] *a.* 准确的; 精确的
- nearly** ['niəli] *ad.* 几乎; 将近
- application** [ˌæpli'keɪʃən] *n.* 应用; 运用
- clear** [kliə] *a.* 清楚的
- understanding** [ˌʌndə'stændɪŋ] *n.* 理解
- Newtonian** [nju(:)'təʊnjən] *a.* 牛顿学说的
- importance** [ɪm'pɔ:təns] *n.* 重要性
- science** ['saɪəns] *n.* 科学; 学科
- engineering** [ˌendʒɪ'nɪəriŋ] *n.* 工程学
- remain** [ri'meɪn] *vi.* 保持
- uniform** ['ju:nɪfɔ:m] *a.* 均匀的
- speed** [spi:d] *n.* 速度
- straight** ['streɪt] *a.* 直的
- line** [laɪn] *n.* 线
- unless** [ˌʌn'les] *conj.* 除非
- rate** [reɪt] *n.* 率; 速率
- momentum** [məʊ'mentəm] *n.* 动量
- impress** [ɪm'pres] *vt.* 施加
- direction** [di'rekʃən] *n.* 方向
- suitable** ['sju:təbl] *a.* 适合的; 相适应的
- choice** [tʃɔɪs] *n.* 选择
- equal** ['i:kwəl] *a.* 等于
- opposite** ['ɒpəzɪt] *a.* 反向的; 相反的
- resultant** [ri'zʌltənt] *n.* 合力
- externally** [eks'tə:nli] *ad.* 外部的
- apply** [ə'plai] *vt.* 施加
- mass** [mæs] *n.* 质量
- times** [taɪmz] *n.* 倍 (用来表示倍数或乘法)

- **velocity** [vi'lɒsiti] *n.* 速度; 速率
 ✓ **constant** ['kɒnstənt] *a.* 恒定的
 ✓ **acceleration** [æk'selə'reiʃən] *n.* 加速(度)
wrongly ['rɒŋli] *ad.* 错误地
 ✓ **vary** ['veəri] *vi.* 变化
 ✓ **circumstance** ['sə:kəmstəns] *n.* 情况
 ✓ **unsound** [ʌn'saund] *a.* 根据不足的
misleading [mis'li:diŋ] *a.* 使人误解的
fundamentally [ˌfʌndə'mentli] *ad.* 基本地

✓ **gravitation** [ˌgrævi'teɪʃən] *n.* 引力; 重力
 ✓ **planet** ['plænit] *n.* 行星
 ✓ **satellite** ['sætəlaɪt] *n.* 卫星; 人造卫星
familiar [fə'miljə] *a.* 熟悉的; 常见的
precision [pri'si:ʒən] *n.* 精确; 精密
hence [hens] *ad.* 因此
accept [ək'sept] *vt.* 接受; 承认
suppose [sə'pəuz] *vt.* 假定
gravitational [grævi'teɪʃənl] *a.* 引力的; 重力的

词 组

on the basis of 在...基础上
(to) be known as 以...知名; 被认为是...
in accordance with 与...一致; 按照, 依据
at rest 静止的

(to) act on (upon) 对...起作用
(to) be proportional to 与...成比例
(to) be equal to 与...相等
(to) be defined as 定义为...
(to) be linked with 与...连系起来、

注 释

- ① This subject was first soundly established in the 17th century on the basis of the axiom usually known as Newton's laws of motion. 这是一句简单句。first 为副词, 作状语, 说明 was established, 意思是“最初”; on the basis of ... laws of motion 是介词短语, 作状语, 说明 was established; on the basis of 的意思是“以...为基础”, “根据...”; known as ... 为过去分词短语, 作定语, 修饰 axiom。
- ② Although certain modifications are now known to be necessary for the precise formulation of dynamics in accordance with modern developments: 这是让步状语从句, 其中 to be necessary ... dynamics 为不定式短语, 作主语补足语; in accordance with modern developments 为介词短语, 作状语, 修饰前面的不定式短语 to be necessary ...; in accordance with 的意思是“与...一致”, “与...相适应”。

- ③ is of the first importance: to be of importance 是“具有重要性”的意思, to be of the first importance 即“第一重要”, 因此可译为“最为重要”, 类似的还有 to be of significance “有意义”等。
- ④ By suitable choice of units one may say that the rate of change of momentum is equal to the force. 这是一句主从复合句。by suitable choice of units 为介词短语, 作状语, 修饰主句中的 may say, 这里 by 的意思是“凭借”、“用...办法”等, 意思与 by means of 相同; that ... force 为宾语从句, 其中 to be equal to 的意思是“等于”。
- ⑤ As mass can vary in several circumstances this is unsound and misleading. 这是主从复合句。as 在这里是连接词, 意思是“因为”, 它所引导的是状语从句, 表示原因。
- ⑥ They do not move in straight lines with uniform speed, hence if we accept the first law we must suppose that they are acted upon by those forces which we call gravitational. 这是一句并列主从复合句。第一分句 they ... uniform speed 是简单句; 第二分句 hence ... gravitational 是主从复合句, 在第二分句中: hence 是副词, 起状语作用; if we accept the first law 为条件状语从句; that they are ... those forces 为宾语从句; which we call gravitational 为定语从句, 修饰 forces, 定语从句中的 gravitational 为宾语补足语(= we call the forces: gravitational)。