普通高等学校"十二五"规划教材

电气信息类专业英语

主 编 胡 皓

参 编 周妮娜 王亚云

西安电子科技大学出版社

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内 容 简 介

本书具有选材广泛、内容丰富、专业性和实用性强的特点，可使读者通过较短时间的学习，显著提高专业英语词汇量以及专业文献的阅读、翻译和写作能力。

全书主要内容包括电路基础、模拟电子技术和数字电子技术、控制理论、计算机控制技术、过程控制及自动化技术的综合应用等方面的内容。每课都由语言现象、词汇表、课文、注释、阅读资料和练习等六部分组成，同时给出了课文的参考译文，具有较强的知识延伸性。

本书可作为自动化、电子信息工程、电气工程及其自动化、测控技术与仪器、机电一体化及其他相关专业的教材，也可用于成人教育及职工培训，同时可供相关专业的工程技术人员作为参考书。

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前　　言

信息科学与技术的迅速发展和广泛应用，深深地改变着人类生产、生活的各个方面。人类社会生产力的发展和人们生活质量的提高越来越得益和依赖于信息科学与技术的发展。电气信息技术涉及信息的检测、分析、处理、控制和应用等各个方面，是信息科学与技术领域的重要组成部分。在我国经济建设的进程中，工业化是不可逾越的发展阶段。面对全面建设小康社会的发展目标，党和国家提出走新型工业化道路的战略决策。这是一条我国当代工业化进程的必由之路。实现新型工业化，就是要坚持走科技含量高、经济效益好、资源消耗低、环境污染少、人力资源优势得到充分发挥的可持续发展的科学发展之路。在这个过程中，电气信息技术起着不可替代的重要作用。

我国高等教育中工科在校大学生人数占在校大学生总数的 35%～40%，其中电气信息类专业是工科各专业中学生人数最多的专业之一。在我国高等教育已进入大众化阶段的今天，人才培养模式多样化已成为必然的趋势，其中应用型人才是我国经济建设和社会发展需求最多的一大类人才。为了促进电气信息领域应用型人才的培养，我们编写了该教材，供学生学完公共英语后进一步学习使用。

本书面向地方院校电气信息类专业教学，适用于有一定英语基础的读者。由于院校之间、专业之间的差异性，教材中难免会出现一些问题和不足，欢迎选用本书的教师、学生提出批评和建议。

本书内容包括电路基础、模拟电子技术和数字电子技术、控制理论、计算机控制技术、过程控制及自动化技术的综合应用等方面的内容，涵盖了电气信息各专业的各个发展方向，内容新颖、全面、系统、精练。每篇文章后都附有词汇表和注解，并配有科技英语语言常见现象解析、翻译等诸多内容，使读者在学习并掌握专业词汇和翻译技能的同时开阔眼界。本书可作为电气信息各专业的专业英语课程的教材，也可供有关工程技术人员参考之用。

胡皓担任本书主编并主持本书编写大纲的制订及全书的统稿工作，并编写了第三和第四部分，周妮娜编写了本书的第二和第五部分，王亚云编写了第一和第六部分。

鉴于作者水平有限，加之时间仓促，书中不妥之处在所难免，敬请专家和读者赐教。

编　者

2013 年 1 月

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Part 1 Fundaments of Electric Circuit

1.1 Electrical Network and Basic Elements

1.1.1 语言现象

1．专业英语(Specified English)概述

随着科学技术的迅猛发展，新技术、新学科、新材料、新工艺的不断出现，各层次技术交流的日益频繁，用英语撰写的科技文献大量出现。20世纪70年代以来科技英语在教育领域逐渐成为一种专业，对科技英语的研究也在不断深入，在科技翻译方面出版了大量的论文、专著，以探讨其翻译理论和翻译方法。

什么是科技英语？它和公共英语之间有哪些区别与联系呢？科技英语是指科技文体，包括英语科技论文、科技报告、科普文章、科技新闻和科技产品说明书等与科技有关的各种文献，它有别于一般英语和文学英语，对科技文体的翻译也有别于其他文体的翻译。要搞好科技英语翻译就要了解科技英语的词汇、语法、句法和特征，熟悉科技英语的思维翻译过程，掌握科技英语的翻译原则和标准，懂得科技英语的翻译技巧，学习有关的专业知识，打好扎实的功底。

科学技术是由许多专业构成的，每一个专业涉及的词汇又有一定的不同。为了掌握科技英语的一般规律，从某一个、某一类专业英语的规律认识起，不失为一种从特殊到一般的解决问题的思维方式。

经过公共英语的学习后，我们基本掌握了英语的常用语法，并具有4000以上的词汇量，具备了一定的英语基础。进入高年级后，随着专业课的进一步学习，学生的专业知识技能也开始逐渐加强。具备以上两个条件后，应进行专业英语的训练，在保证约30万词以上的阅读量的基础上，达到阅读本专业英文资料的基本要求。换言之，掌握专业外语技能是大学英语学习的主要目的之一，是一种素质上的提高，直接关系到学生的求职和毕业后的工作能力。

专业英语的重要性体现在很多方面，大到日益广泛的国际间科学技术交流，小到产品说明书的阅读。而近几年普及的 Internet 网为工程技术人员提供了更为巨大的专业信息，作为主要网络语言的英语则对资料查询者提出了更高的要求。

尽管很多人在此之前已经进行了多年的公共英语学习，但专业英语的学习仍是很必要的。首先，专业英语在词义上具有不同于公共英语的特点和含义，如下例：

Provided you fulfill the terms of the credit, we will accept and pay at maturity the draft presented to us under this credit.

错误译法：在贵公司履行信用条款的条件下，我行将接受并于成熟之日支付信用证下提

示的汇票。

正确译法：我们行承兑并与期满时支付信用证项下提示的汇票。

句中的 accept 和 maturity 的常用意义分别为“接受”和“成熟”，而在此处，accept 意为“承兑，即远期汇票的付款人接受汇票，正式确认如期支付汇票金额的责任”；maturity 意为“(票据的)到期”。两处错误显然是因为忽略了这两个词在专业英语中的特别意义。

通过以上的例子，我们不难认识到专业词汇的一些特点，即同一个词在日常生活中，在不同的专业中可能会有截然不同的含义。例如 bus 这个词，在日常生活中是“公共汽车”的意思，但在计算机中是指“总线”，在电力系统中是指“母线”。单靠日常用语进行望文生义的判断不仅会闹笑话，还有可能出事故。如：

If a mouse is installed in a computer, the available memory space will reduce.

应译为：若接上鼠标，可利用的存储空间将减小。

其次，外文科技文章在结构上也具有很多自身的特点，如长句多、被动语态多、名词化结构多等，这都给对原文的理解和翻译带来了难以解决的困难。如：

It may be the inductor voltage rather than the current in the variable of interest in the circuit.

应译为：在该电路中关心的变量是电感电压而不是电流。

再者，专业英语对听、说、读、写、译的侧重点不同。其最主要的要求在于“读”和“译”，也就是通过大量的阅读对外文资料进行正确的理解和翻译(interpretation & translation)；在读和译的基础上，对听、说、写进行必要的训练。此外，专业外文资料涉及许多科技内容，往往极为复杂且难以理解，加之这类文章的篇幅通常很长，所以只有经过一定的专业外语训练，才能完成从公共英语到专业英语的过渡，达到学以致用的最终目的。

专业翻译是指把科技文章由原作语言(source language)用译文语言(target language)忠实、准确、严谨、通顺、完整地再现出来的一种语言活动。它要求翻译者在具有一定专业基础知识和英语技能的前提下，借助于合适的英汉科技字典来完成整个翻译过程。专业翻译直接应用于科技和工程，因而对翻译的质量具有一定的要求。翻译上的失之毫厘，工程中就有可能差之千里，造成巨大的损失。例如，有这样一个标志牌：

Control Center, Smoking Free.

它的意思是“控制中心，严禁吸烟”，free 在这里作“免除……的”讲；而如果理解为“随便的，自由的”，就会产生完全相反的意义。

想翻译出一篇好的科技文体的文章来，并不是一件容易的事。仅仅依靠对英语的掌握或对汉语的文字驾驭能力，都不能搞好科技翻译。因为科技翻译是一个复杂的过程，涉及多方面的素质，必须综合各方面的因素。

第一，必须具备科学严谨的态度。历数翻译界的专家学者所从事的翻译事业，可以看出他们付出了艰辛劳动，耗费了很多精力，进行了大量实践，呈现给读者一篇篇值得反复阅读的优秀译文，给我们带来知识、带来美感、带来享受。科技翻译必须严肃认真，一丝不苟，勤查词典，不能想当然地主观猜测。一个词、一个符号、一个数字都须准确理解其作用、含义。

第二，必须具备良好的英语语言基础。熟练掌握英语是进行英汉转换的前提。对英语一知半解，就不能很好地理解原文，更无从谈起翻译，也就不可能有好的译作。事实证明，没有扎实的英语基础，仅凭词典加翻译机器是搞不好科技翻译的。

第三，必须具备熟练地驾驭汉语的能力。同样，没有熟练地驾驭汉语语言的能力，即使理解得很透彻，翻译出来的文字不是晦涩难懂，就是语义模糊，让人似懂非懂。

第四，必须具备广博的专业及相关领域的知识。当今科技发展迅速，学科之间交叉渗透普遍，一个领域里会有另外领域的知识。因此，只有经常学习本专业和相关专业的知识，才能胜任科技翻译的工作。

第五，必须具备必要的英语翻译理论和技巧。理论是指导实践的有效工具，有时一个段落、一个句子或一个术语，尽管了然于心，但往往苦于找不到合适的方法进行表达，令人非常苦恼，而必要的理论知识会使人豁然开朗。

第六，必须具备大量实践经验的积累。范武邱先生所编著的《实用科技英语翻译讲评》中有一句话说得非常好：一般认为，没有十万字的翻译实践而去谈理论基本上是纸上谈兵，其实用性和可操作性让人生疑。从中可见翻译实践经验的积累对搞好翻译至关重要。

2. 常见公式及符号的表达和译法

在专业英语中，数词出现的频率很高，对数词的翻译及读法的掌握程度会影响对专业的学习、研究及交流。现分别介绍一些专业英语中常用的数词的译法和数学符号、公式的读法。

1) 基数词的表达和译法

从 1 到 12 是单个单词。如，11 读做 eleven；12 读做 twelve。

从 13 到 19 加后缀-teen。如，13 读做 thirteen；19 读做 nineteen。

从 20 到 90 加后缀-ty。如，20 读做 twenty；23 读做 twenty-three；90 读做 ninety。

百位数以上需连起来。如，500 读做 five hundred；561 读做 five hundred (and) sixty-one；5,661 读做 five thousand six hundred (and) sixty-one。

2) 序数词的表达和译法

序数词翻译时加“第……”。如 twelfth：12 th，第十二；thirtieth：30th，第三十。

3) 数词的增加和减少的表达和译法

例：The oxygen atom is nearly 16 times heavier than the hydrogen atom.

氧原子的重量几乎是氢原子的 16 倍(如果把 16 用 n 代替，常译做“是……的 n 倍，或“比……(大、多、长) n–1 倍”)。

例：The diode produces 5 times more radiant power than that one.

这只二极管的辐射功率比那只大 4 倍(是那只的 5 倍)。

The wire is twice as long as that one.

这根电线的长度是那根的两倍(如果把 twice 用 n 代替，常译做“是……的 n 倍，或“比……(大、多、长) n–1 倍”)。

例：The production of air-conditioners has increased three times this year.

今年空调的产量增加 2 倍(增加到 3 倍)(如果句中 three 用 n 表示，那么常译成“增加了 n–1 倍或增加到 n 倍”)。

The production of air-conditioners has increased by three times over the previous year. 今年空调的产量比上一年增加了 3 倍。

The production of air-conditioners has decreased by three times over the previous year. 今年空调的产量是去年的 1/3。

The production of air-conditioners has increased to three times this year. 今年空调的产量增加到了 3 倍。

The production of air-conditioners has increased by a factor of three times this year. 今年空调的产量增加 2 倍。

如果句中 three 用 n 表示，那么常译成“增加了 n−1 倍”。类似减少的译法如：

reduce by 10%：减少了 10%；reduce to 10%：减少到 10%；reduce by a factor of 10：减少了 9/10(减少到 1/10)；reduce 10 times：减少到 1/10(减少了 9/10)。

4) 分数、小数、时间的表达和译法

简单的分数容易表达。如：1/7，one seventh；3/4，three quarters；1/4，a/one quarter；1/2，a/one half；$4\frac{1}{2}$，four and a half；$3\frac{4}{5}$，three and four-fifths。

复杂的分数，表达亦有一定的规律。如：24/9，twenty-four over nine；20/83，twenty over eighty three (twenty eighty-thirds)；7/20，seven twentieths；67/200，sixty-seven two hundredths。

小数容易表达。如：0.124，(nought) point one two four；0.24，(nought) point two four；0.4 (nought) point four；16.789，one six point seven eight nine。

时间或其他，表达时有一定的规律。如，60 年代初期：in the early sixties；本世纪 90 年代：in the nineties of the century；20 世纪 90 年代(1990s，1990’s)：nineteen nineties；2005 年 10 月 10 日：October 10th, 2005 (10th October, 2005/October 10, 2005/10 October 2005)；Fig.7：图 7(直译)；14′59.38″：十四分五十九点三八秒，fourteen minutes fifty-nine point thirty eight seconds。

5) 数学符号、公式的表达和译法

常见的有：

+ 加(上) plus，positive，and

− 减(去) minus，negative

× 乘以 times，multiplied by

÷ 除以 divided by，above

= 等于 be equal to /equals/be

≈ 大约等于 is approximately equal to

( ) 圆括号 round brackets/parentheses

[ ] 方括号 squared brackets

/ 斜杠 slash

65% 百分之六十五 65 percent

10^9 十的九次方 the ninth power of ten/ten to the power nine/ten to the ninth power

10^{-5} 十的负五次方 ten to the minus five

x' x prime

dy/dx the first derivative of y with respect to x

x'' x second prime

d^2y/dx^2 the second derivative of y with respect to x

$\int_a^b$ integral between limits a and b

x_e x sub e

$\sqrt{2}$ 根号 2 the square root of 2

≥ 大于或等于 is more than or equal to

≤ 小于或等于 is less than or equal to

$>$ 大于 is more than

δ delta

Φ Phi

Ω omega

ε epsilon

∝ 与……成比例 varies as/ is proportional to

ω omega

5 mm 5 毫米 5 millimeters

$x \to \infty$ x approaches to infinity

1.1.2 Specified English Words

electrical device 电气设备；电气元件；电气装置

conducting lead 引线体，导线端

resistor n. 电阻器

resistance n. 抵抗；抵抗力；反抗；电阻；阻力

inductor n. 授职者；圣职授予的人；感应器；电感器

capacitor n. 电容器

capacitance n. 电容；电流容量

passive elements 无源元件

active elements 有源元件

circuit diagram 电路图

power n. 能力；力量；功率；幂；势力；政权 vt. 激励

sine n. 正弦

time-variable 时变的

coil vt. 盘绕，把……卷成圈 n. 卷；线圈 vi. 成圈状

transformers n. 变压器

dielectric adj. 非传导性的；诱电性的 n. 电介质；绝缘体

mechanism n. 机械装置；机制；技巧；原理，途径；进程

deficiency n. 缺乏；不足的数额；缺陷，缺点

equalization n. 均等；同等化；均衡

junction n. 连接，接合；交叉点；接合点

term n. 学期；术语；条款；期限 vt. 把……叫做

distributed adj. 分布式的，分散式的

instantaneous adj. 即时的；瞬间的；猝发的

magnetic field 磁场

1.1.3 Text

Electrical Network and Basic Elements

A circuit (electrical network) is an interconnection of electrical elements such as resistors, inductors, capacitors, transmission lines, voltage sources, current sources and switches. An electrical circuit is a special type of network, one that has a closed loop giving a return path for the current. Electrical networks that consist only of sources (voltage or current), linear lumped elements (resistors, capacitors, inductors), and linear distributed elements (transmission lines) can be analyzed by algebraic and transform methods to determine DC response, AC response, and transient response.

An active network is a network that consists of at least one active source like a voltage source or current source. A passive network is a network which does not contain any active device.

A linear circuit is a circuit which is composed entirely of independent sources, linear dependent sources and linear passive elements or a combination of these. Otherwise it is called as non-linear network.

Sources can be classified as independent sources and dependent sources. Ideal Independent source maintains same voltage or current regardless of the other elements present in the circuit. Its value is either constant (DC) or sinusoidal (AC). Dependent Sources depend upon a particular element of the circuit for delivering the power or voltage or current depending upon the type of source it is.

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. The current through a resistor is in direct proportion to the voltage across the resistor's terminals. Thus, the ratio of the voltage applied across a resistor's terminals to the intensity of current through the circuit is called resistance. Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel-chrome). Resistors are also implemented within integrated circuits, particularly analog devices, and can also be integrated into hybrid and printed circuits.

The electrical functionality of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. When specifying that resistance in an electronic design, the required precision of the resistance may require attention to the manufacturing tolerance of the chosen resistor, according to its specific application. The temperature coefficient of the resistance may also be of concern in some precision applications. Practical resistors are also specified as having a maximum power rating which must exceed the anticipated power dissipation of that resistor in a particular circuit: this is mainly of concern in power electronics applications. Resistors with higher power ratings are physically larger and may require heat sinks. In a high-voltage circuit, attention must sometimes be paid to the rated maximum working voltage of the resistor.

All electrical devices that consume energy must have a resistor (also called a resistance) in their circuit model. Inductors and capacitors may store energy but over time return that energy to the source or to another circuit element. Power in the resistor, given by $p = vi = i^2 R = v^2/R$, is always positive. Energy is then determined as the integral of the instantaneous power

$$w = \int_{t_1}^{t_2} p\mathrm{d}t = R\int_{t_1}^{t_2} i^2\mathrm{d}t = \frac{1}{R}\int_{t_1}^{t_2} v^2\mathrm{d}t \tag{1-1-1}$$

An inductor (also choke, coil or reactor) is a passive two-terminal electrical component that stores energy in its magnetic field. For comparison, a capacitor stores energy in an electric field, and a resistor does not store energy but rather dissipates energy as heat.

Any conductor has inductance. An inductor is typically made of a wire or other conductor wound into a coil, to increase the magnetic field.

When the current flowing through an inductor changes, creating a time-varying magnetic field inside the coil, a voltage is induced, according to Faraday's law of electromagnetic induction, which by Lenz's law opposes the change in current that created it. Inductors are one of the basic components used in electronics where current and voltage change with time, due to the ability of inductors to delay and reshape alternating currents.

The circuit element that stores energy in a magnetic field is an inductor (also called an inductance). With time-variable current, the energy is generally stored during some parts of the cycle and then returned to the source during others. When the inductance is removed from the source, the magnetic field will collapse; in other words, no energy is stored without a connected source. Coils found in electric motors, transformers, and similar devices can be expected to have inductances in their circuit models. Even a set of parallel conductors exhibits inductance that must be considered at most frequencies. The power and energy relationships are as follows.

$$p = vi = L\frac{\mathrm{d}i}{\mathrm{d}t}i = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{1}{2}Li^2\right) \tag{1-1-2}$$

$$w_L = \int_{t_1}^{t_2} p\mathrm{d}t = \int_{t_1}^{t_2}\left(L\frac{\mathrm{d}i}{\mathrm{d}t}i\right)\mathrm{d}t = \frac{1}{2}L(i_2^2 - i_1^2) \tag{1-1-3}$$

Energy stored in the magnetic field of an inductance is $w_L = \frac{1}{2}Li^2$.

A capacitor (originally known as condenser) is a passive two-terminal electrical component used to store energy in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors separated by a dielectric (insulator); for example, one common construction consists of metal foils separated by a thin layer of insulating film. Capacitors are widely used as parts of electrical circuits in many common electrical devices.

When there is a potential difference (voltage) across the conductors, a static electric field develops across the dielectric, causing positive charge to collect on one plate and negative charge on the other plate. Energy is stored in the electrostatic field. An ideal capacitor is characterized by a single constant value, capacitance, measured in farads. This is the ratio of the electric charge on each conductor to the potential difference between them.

The capacitance is greatest when there is a narrow separation between large areas of conductor, hence capacitor conductors are often called "plates", referring to an early means of construction. In practice, the dielectric between the plates passes a small amount of leakage current and also has an electric field strength limit, resulting in a breakdown voltage, while the conductors and leads introduce an undesired inductance and resistance.

Capacitors are widely used in electronic circuits for blocking direct current while allowing alternating current to pass, in filter networks, for smoothing the output of power supplies, in the resonant circuits that tune radios to particular frequencies, in electric power transmission systems for stabilizing voltage and power flow, and for many other purposes.

When the voltage is variable over a cycle, energy will be stored during one part of the cycle and returned in the next. While an inductance cannot retain energy after removal of the source because the magnetic field collapses, the capacitor retains the charge and the electric field can remain after the source is removed. This charged condition can remain until a discharge path is provided, at which time the energy is released. The charge, $q=Cv$, on a capacitor results in an electric field in the dielectric which is the mechanism of the energy storage. In the simple parallel-plate capacitor there is an excess of charge on one plate and a deficiency on the other. It is the equalization of these charges that takes place when the capacitor is discharged. The power and energy relationships for the capacitance are as follows.

$$p = vi = Cv\frac{\mathrm{d}v}{\mathrm{d}t} = \frac{\mathrm{d}}{\mathrm{d}t}\left(\frac{1}{2}Cv^2\right) \tag{1-1-4}$$

$$w_C = \int_{t_1}^{t_2} p\mathrm{d}t = \int_{t_1}^{t_2} Cv\mathrm{d}v = \frac{1}{2}C(v_2^2 - v_1^2) \tag{1-1-5}$$

The energy stored in the electric field of capacitance is $w_C = \frac{1}{2}Cv^2$.

In the analysis of the circuit, every circuit diagram can be constructed in a variety of ways which may look different but are in fact identical. The diagram presented in a problem may not suggest the best of several methods of solution. Consequently, a diagram should be examined before a solution is started and redrawn if necessary to show more clearly how the elements are interconnected. An extreme example is illustrated in Fig. 1.1, where the three circuits are actually identical. In Fig.1.1(*a*) the three "junctions" labeled A are shown as two "junctions" in (*b*). However, resistor R_4 is bypassed by a short circuit and may be removed for purposes of analysis. Then, in Fig 1.1 (*c*) the single junction A is shown with its three meeting branches.

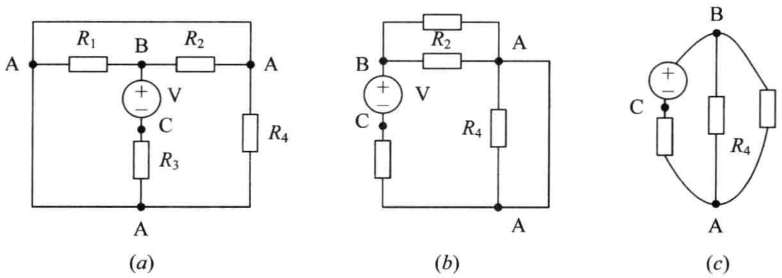

Fig. 1.1 example that the three circuits are actually identical

A number of electrical laws apply to all electrical networks. These include:

Kirchhoff's current law: The sum of all currents entering a node is equal to the sum of all currents leaving the node.

Kirchhoff's voltage law: The directed sum of the electrical potential differences around a loop must be zero.

Ohm's law: The voltage across a resistor is equal to the product of the resistance and the current flowing through it.

Norton's theorem: Any network of voltage or current sources and resistors is electrically equivalent to an ideal current source in parallel with a single resistor.

Thevenin's theorem: Any network of voltage or current sources and resistors is electrically equivalent to a single voltage source in series with a single resistor.

☞ Notes

1. A1l electrical devices that consume energy must have a resistor (also called a resistance) in their circuit model.

所有耗能的仪器在其电路模型中都有电阻器(也称为电阻)。

2. The charge, $q=Cv$, on a capacitor results in an electric field in the dielectric which is the mechanism of the energy storage.

电容器中的电荷，$q=Cv$，在电介质中产生电场，这便是电容器储存能量的机理。

3. It is the equalization of these charges that takes place when the capacitor is discharged.

当电容放电时，两极板上的电荷趋向均衡。

1.1.4 Reading Materials

Nonlinear Resistors

The current voltage relationship in an element may be instantaneous but not necessarily linear. The element is then modeled as a nonlinear resistor. An example is a filament lamp which at higher voltages draws proportionally less current. Another important electrical device modeled as a nonlinear resistor is a diode. A diode is a two-terminal device that, roughly speaking, conducts electric current in one direction from anode to cathode, called forward-biased much better than the opposite direction (reverse-biased). The circuit symbol for the diode and an example of its current-voltage characteristic are shown in Fig. 1.2. The arrow is from the anode to the cathode and indicates the forward direction ($i>0$). A small positive voltage at the diode's terminal biases the diode in the forward direction and can produce a large current. A negative voltage biases the diode in the reverse direction and produces little current even at large voltage values. An ideal diode is a circuit model which works like a perfect switch. It's (i, v) characteristic is

$$\begin{cases} v=0 & when\ i\geqslant 0 \\ i=0 & when\ v\leqslant 0 \end{cases} \tag{1-1-6}$$

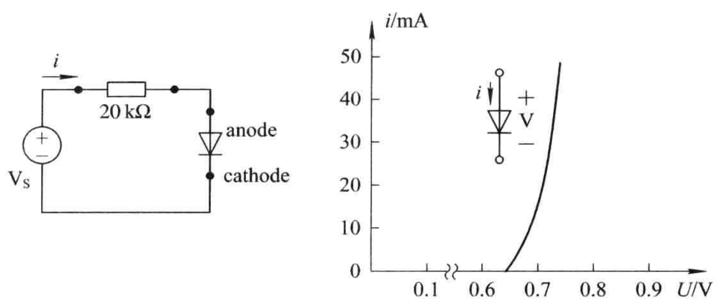

Fig. 1.2 diode's current-voltage characteristic