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高等学校"十五"规划教材

科技英语读写教程

主　编　霍洪涛

副主编　田金佩　李东风　葛利芳　孙　慧

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图书在版编目(C I P)数据

科技英语读写教程/霍洪涛主编. —徐州:中国矿业大学出版社,2005.8

ISBN 7 - 81107- 135 - 5

Ⅰ.科… Ⅱ.霍… Ⅲ.①科学技术—英语—阅读教学—高等学校—教材②科学科技—英语—写作—高等学校—教材 Ⅳ.H31

中国版本图书馆 CIP 数据核字(2005)第 086795 号

书　　名	科技英语读写教程
主　　编	霍洪涛
责任编辑	万士才
责任校对	晓　新
出版发行	中国矿业大学出版社
	(江苏省徐州市中国矿业大学内　邮编 221008)
网　　址	http://www.cumtp.com　**E-mail**:cumtpvip@cumtp.com
排　　版	中国矿业大学出版社
印　　刷	徐州中矿大印发科技有限公司
经　　销	新华书店
开　　本	787×960　1/16　**印张** 13.75　**字数** 337 千字
版次印次	2005 年 8 月第 1 版　2005 年 8 月第 1 次印刷
定　　价	19.00 元

(图书出现印装质量问题,本社负责调换)

前　言

近年来科技英语已成为大专院校的热门学科之一。对于各行业从业人员而言，专业英语水平与其专业能力、业务水准直接相关，甚至影响其事业的成就。而目前，我国教育界在科技英语教学方面尚未形成统一的教学模式，没用统一的教学大纲和教材，各校自行其事，有的院校甚至敷衍了事。国外英语教育界从20世纪中叶就提出ESP(English for Special Purposes)教学模式，尽管语言学界就ESP的理论基础曾有过争论，但从教学实践来看，ESP的确为学生快速接触和准确使用专业英语提供了捷径。作为ESP之一的科技英语经过多年的实践证明，也的确是一门迅速提高科技英语应用能力的必不可少的手段。

本书旨在让读者掌握专业英语词汇，熟悉科技英语的表达方式，流利地阅读英文专业科技读物，切实提高各专业英语能力，丰富科学专业知识。科技英语是英语专业和非英语专业共修的一门选修课程，在修完“大学英语”或“基础英语”课程后开设。科技英语的阅读与写作无论是对英语专业或非英语专业本科生，还是对理工类硕士研究生来说，都是一门非常重要的应用英语课程。

本书作者立足于多年的积累和精心提炼，针对科技英语阅读、写作的实际情况，以阅读为基础，从标点符号、构词法、句式等诸多方面对科技英语的语言进行了分析，并对不同语体进行了系统的分类和总结，给出了大量的应用实例，便于读者查阅、参考和引证。本书具有突出的实用性与新颖性特点，内容包括大量科技英语基础知识，可以让读者学习到目前最新的科技英语知识，并学以致用。其结构非常适合组织教学，并且就专业性较强的部分加上了注释，提供了有针对性的练习，可同时兼顾专业人员自学。

本课程选材内容均来自于原版英文书刊，杂志，文献资料等，内容新颖，连贯性强，语言规范纯正，语体多样，突出体现了科技英语的词汇特点和篇章结构特点。通过指导学生阅读、讲解、练习、模仿写作，帮助同学熟悉有关新学科的专业术语和概念，进一步提高学生阅读、理解英语专业文献的能力；培养对难度较高的科技文献的理解能力，使学生逐步适应科技英语书面语体的特点和表达形式，能够准确、流畅地阅读、翻译英语文献，并能在熟练地掌握英语工具、获取专业所需的信息的基础之上，撰写出合乎规范的科技英语的文章。

囿于编者水平，加之时间仓促，本书错漏之处在所难免，恳请广大读者提出宝贵的批评意见。

编　者
2005 年 7 月 15 日

目　录

第一单元　科技英语的语体特征

语言的使用要得体。得体的语言，要符合当时的环境，符合说话者和听话者的身份和语言习惯，其实，就是要符合当时的语境。一个语言使用得体的人往往能够自由地、无意识地选择最恰当的词汇和语句来适应语境。

那么，什么是语境？语境是言语行为所涉及到的客观条件和背景，包括特定的时间、特定的空间、特定的情景、特定的人物等。我们在交际过程中受到语境因素的制约，必须选择某种语言变体，即语体。任何一种语言都有不同的语体。

我们可以把英语分为普通英语(EGP—English for General Purposes)和专用英语(ESP—English for Special Purposes)两类。EGP 顾名思义是没有任何严格专业界限的日常英语，ESP 是用于专业目的的英语。ESP 又可以进一步分为学术英语(EAP—English for Academic Purposes)和职业英语(EOP—English for Occupational Purposes)。科技英语(EST—English for Science and Technology)是 EAP 中一种重要的语体形式。

什么是语体？从写作的角度来看，是指写作的方式，亦即使用文字表达思想、感情的方式，就是从写作的观点探讨作品的遣词和造句；从语言的功能来说，语体则是语言交际场合中使用者的沟通方式；而从语言的本质的角度出发，语体可以说是一部作品(或称之为文本或语篇)的一切内、外在结构和因素，包括词汇、句法、篇章修辞，以及社会、历史、文化等因素和读者的反应等等。

我们这里谈的“语体”，不同于文艺批评中所使用的文体、文风、风格等概念。人们一般从文学创作或写作艺术的角度谈文体、文风、风格。作家在创作过程中，基于美学的标准，赋予作品某种特定的结构特征，这便是文体风格。

如果说“文体风格”张扬了作者的个性，体现了作者独特的创作特征的话，那么，“语体”是某个特定语言社群中人们共同接受并使用的客观语言形式。因此，语体是指在一定的语言环境中形成的具有一定的表达特点、风格和语感的语言体系，是人们在长期语言运用的过程中，对语言运用与语境之间的选择关系类型化的结果。现实生活中交际语境的类型化，为语言运用的类型化提供了客观的基础。这种类型化不是一时完成的，而是经历了一个由不确定态到范模化的历时沉

淀过程，是具体的、个人的话语(discourse)或语篇(text)经反复运用所形成的为特定语言社群全体成员所共识并遵守的约定俗成的语用范式。

就语言的传播方式来讲，又有口语语体和书面语语体两种。需要说明的是，这里的口语语体与普通概念的“口语”不同。普通概念的“口语”是凭借语音来作为信息载体形式的，也就是用嘴说出来的。其实，用书面形式写下来的，也有口语语体的，例如书信和演讲报告就属于口语语体。书面语体与普通概念的“书面语”也不同。普通概念的书面语是凭借文字符号来作为信息载体形式的，也就是用笔写下来的，然而，有用口语形式表达出来的“书面语体”的，如电影中的解说词、电台播音员的每日新闻广播等等。

口语语体是适应面谈的交际需要而形成的，所以也叫谈话语体。口语语体的主要特点是：平易、自然，不事雕琢，有跳跃性。书面语体是适应书面交际的需要，在口语的基础上经过加工而形成的。书面语体的主要特点是：结构完整，讲究条理性，具有规范性。

就语言的表达内容和功能来分，又有新闻语体、政论语体、事务语体、广告语体、文艺语体和科技语体等。不同语体的行文风格不同。下面我们以常见的文艺语体(包括散文体、韵文体、戏剧体)和科技语体为例作一说明。

文艺是一定的社会生活反映在文学家头脑中的产物，它通过文艺家的主观感受去反映人类社会的各种关系；科学则是关于客观自然的知识体系，它以客观的方式直接揭示自然界活动的规律。由于科学与文艺反映世界的对象与方式不同，科学的语言与文艺的语言情趣各异，两者在语体风格上各自形成了鲜明的特点。文艺主要是借助形象思维，通过语言描绘塑造艺术形象；科学是借助周密的逻辑思维，通过实验论证来揭示客观世界。文艺语体讲究生动形象，含蓄蕴藉，使用比喻和夸张等修辞格追求各种艺术效果，传达作者的思想和情感，给读者以美学震撼；科技语体要求用词准确，语句平白，结构严谨，数据精确，旁征博引，直接用语言向读者传递信息、说明道理。作为艺术家的莎士比亚(William Shakespeare)是这样描写人的：

What a piece of work is a man! How noble in reason! How infinite in faculty! In form and moving how express and admirable! In action how like an angel! In apprehension how like a god! The beauty of the world! The paragon of animals! (*Hamlet*)(人类是个多么美妙的杰作！它拥有着崇高的理智，也有无限的能力与优美可钦的仪表。其举止就如天使，灵性可媲神仙。它是天之骄子，也是万物之灵。)

但是，二十世纪初期英国生物学家 L. A. Borradaile 在给“人”下定义的时候，使用的完全是另一套语言：

Man is metazoon, triploblastic, chordale, vertebrate, pentadactyle, mammalian, eutherian, primate. The main outlines of each of his principal system of organs may be traced back, like those of other mammals, to the fishes.（人属于后生动物，系五趾、三胚层高级动物，属脊索动物门，脊椎动物亚门。哺乳纲，真兽亚纲，灵长。像其他哺乳动物一样，他的每一个器官系统的轮廓可以追溯到鱼类的器官系统。）

科技英语基本词汇虽然属于英语的共核部分，但是，它具有大量的高度专业化的词汇（包括准技术词汇和专业词汇），并大量运用术语、符号、公式和图表。科技词汇意义单一，概念准确，无明显的歧义现象。科技英语的句子结构和语法也很有特色，例如大量使用被动句和无主句等。

科技语体大致包括六大类：

① 法律文书，包括专利说明书、技术标准法规、技术合同、国际科学协会的章程和文件等。

② 专业文书，包括论文、科研报告、试验报告等。

③ 科技英语专著和科技教科书。

④ 科技英语说明文，包括产品技术说明书、产品安装说明书、产品使用说明书等。

⑤ 科技英语公文。

⑥ 科普读物，包括文学性科普读物和科学性科普读物两大流派。

前五种属于专用科技语体，第六种是通俗科技语体，是写给不熟悉本学科的人看的，寓知识于趣味之中。专用科技文体采用哲理性的语言，是写给专业科技人员看的，语言要求准确、简洁、符合程式规范。

阅读下面两篇文章，分析文学语体与科技语体间的语体特征差别。

Text A（文学语体）

Pompeii

By Robert Silverburg

Not very far from Naples, a strange city sleeps under the hot Italian sun. It is the city of Pompeii, and there is no other city quite like it in all the world. Nothing lives in Pompeii except beetles and lizards. Yet every year thousands of people travel from distant countries to visit it. Pompeii is a dead city. No one has lived there for nearly two thousand years—not since the summer of the year A. D.

79, to be exact.

Until that year Pompeii was a prosperous city of 25,000 people. Nearby was the Bay of Naples, an arm of the blue Mediterranean. Rich men came down from wealthy Rome to build seaside villas. Farmlands surrounded Pompeii. Rising behind the city was the 4,000-foot Mount Vesuvius, a grass-covered slope where the shepherds of Pompeii took their goats to graze. Pompeii was a busy city and a happy one.

It died suddenly, in a terrible rain of fire and ash. The tragedy struck on the 24th of August, A. D. 79. Mount Vesuvius, which had slept quietly for centuries, erupted with savage violence. Tons of hot ash fell on Pompeii, hiding it from sight. For three days the sun did not break through the clouds of volcanic ash that filled the sky. And when the eruption ended, Pompeii was buried deep. A city had perished.

Centuries passed... Pompeii was forgotten. Then, seventeen hundred years later, it was discovered again. Beneath the protecting shroud of ash, the city lay intact. Everything was as it had been the day Vesuvius erupted. There were still loaves of bread in the ovens of the bakeries. In the wine shops, the wine jars were in place, and on one counter could be seen a stain where a customer had thrown down his glass and fled.

To go to Pompeii today is to take a trip in time. The old city comes to life all around you. You can always hear the clatter of horses' hoofs on the narrow streets, the cries of children and the laughter of the shopkeepers. The sky is cloudlessly blue, with the summer sun high in the sky. The grassy slope of great Vesuvius rise to the heavens behind the city, and sunlight shimmers on the waters of the bay a thousand yards from the city walls. Ships from every nation are in port and strange languages can be heard in the streets.

Such was Pompeii on its last day. And so it is today, now that the volcanic ash has been cleared away. A good imagination is all you need to restore it in activity.

At dawn on August 24, in the year A. D. 79, Pompeii's 25,000 people awakened to another hot day in that hot summer. There was going to be a contest in the arena that night and the whole town was looking forward to the bloody fights of the gladiators. The children headed toward school, carrying slates and followed by their dogs. In the forum the town's important men had gathered after breakfast to read the political signs that had been posted during the night. Elsewhere in the forum the wool merchants talked business. The baker was going over his account books. At the inn late-rising travelers from the East awakened and yarned and called for breakfast.

The quiet morning moved slowly along. There was nothing very unusual about Pompeii. But tragedy was on its way. Beneath Vesuvius' vine-covered slopes a mighty force was about to break loose. At one o'clock in the afternoon, the critical point was reached. The mountain blew up, raining death on thousands. Down in Pompeii, four miles from the summit, a tremendous explosion was heard.

"What was that?" people cried from one end to another. They stared at each other, puzzled, troubled. Were the gods fighting in heaven?

"Look!" somebody shouted. "Look at Vesuvius!"

Thousands of eyes turned upward. Thousands of arms pointed. A black cloud was rising from the shattered summit of the mountain. Higher and higher it rose. Like the trunk of a tree, it rose in the air, branching out as it climbed.

Minutes passed. The sound of explosion died away, but it still reverberated in everyone's ears. The cloud over Vesuvius continued to rise, black as night, higher and higher. A strange rain began to fall on Pompeii—a rain of stones. The stones were light. They were pumice stones, consisting mostly of air bubbles. These poured down as though there had been a sudden cloudburst. The pumice stones did little damage.

"What is happening?" Pompeiians asked one another. They rushed to the temples—the Temple of Jupiter, the Temple of Apollo, the Temple of Isis. Priests tried to calm down the citizens. The sky was dark. An hour went by and darkness still shrouded everything. All was confusion. The people of Pompeii now knew that doom was at hand. Their fears were redoubled when the tremendous rain of hot ash began to fall. The wooden roofs of some of the houses began to catch fire as the heat of the ash reached them. Other buildings were collapsing under the weight of the pumice stones.

In these first few hours, only the quick-witted managed to escape. A wealthy wool merchant called his family together and crammed jewelry and money into a sack. Lighting a torch, he led his little band out into the nightmare of the streets. Many hundreds of Pompeiians fled in those first few dark hours. Stumbling in the darkness, they made their way to the city gates. Out and down to the harbor. They boarded boats and got away, living to tell the tale of their city's destruction. Others preferred to remain within the city, huddling insight the temples, or in the public baths or in the cellars of their homes. They still hoped that the nightmare would end.

It was evening now. And a new trouble was in store for Pompeii. The earth trembled and quaked! Roofs went crashing in ruin, burying hundreds who had hoped to survive the eruption. In the forum the columns toppled. The entire city seemed to shake in the grip of a giant fist.

Three feet of pumice stones now covered the ground. Ash floated in the air. Poisonous gas came drifting from the crater, though people could still breathe. Roofs were collapsing everywhere. The cries of the injured and dying filled the air. Rushing throngs, blinded by the darkness and the smoke, rushed up one street and down the next, trembling the fallen in a crazy fruitless dash toward safety. Dozens of people plunged into dead-end streets and found themselves trapped by crashing buildings. They waited there, too frightened to run further, expecting the end.

The poison gas thickened as the terrible night advanced. It was possible to protect oneself from the pumice stones but not from the gas, and Pompeiians died by hundreds. Carbon monoxide gas prevents the body from absorbing oxygen. Victims of carbon monoxide poisoning get sleepier and sleepier until they lose consciousness, never to regain it. All over Pompeii, people lay down on beds of pumice stones, overwhelmed by the gas, and death came quietly to them.

All through the endless night, Pompeiians wandered about the streets or crouched in their ruined homes or clustered in the temples to pray. By morning few remained alive. Not once had Vesuvius stopped hurling pumice stones and ash into the air, and the streets of Pompeii were filling quickly. At midday on August 25, exactly twenty-four hours after the beginning of the first eruption, a second eruption occurred. A second cloud of ash rose above Vesuvius's summit. The wind blew ash as far as Rome. But most of the new ash descended on Pompeii.

The deadly shower of stones and ash went into its second day. But it no longer mattered to Pompeii whether the eruption continued another day or another year. For by midday on August 25, Pompeii was a city of the dead.

Text B（科技语体）

Magma Ascent and the Pressurization of Mount Etna's Volcanic System

Domenico Patanè, Pasquale De Gori
Claudio Chiarabba, Alessandro Bonaccorso

After a period of deflation during the 1991-1993 flank eruption, Mount Etna underwent a rapid inflation. Seismicity and ground deformation show that since 1994, a huge volume of magma intruded beneath the volcano, producing from 1998 onward a series of eruptions at the summit and on the flank of the volcano. The last of these, started on 27 October 2002, is still in progress and can be considered one of the most explosive eruptions of the volcano in recent times. Here we show how geodetic data and seismic deformation, between 1994 and 2001, indicate a radial compression around an axial intrusion, consistent with a repressurization of Mount Etna's plumbing system at a depth of 6 to 15 kilometers, which triggered most of the seismicity and provoked the dilatation of the volcano and the recent explosive eruptive activity.

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Since 1989, volcanic activity at Mount Etna has been monitored by seismic and geodetic networks, which have improved the capability of observers to track, in near-real time, subsurface magma movements (1,3). Seismicity and eruptions at Mount Etna are not randomly distributed in space and time. The eruptions of the past 30 years are mainly related to magma rising on the two NNW and NE primary structural trends (1, 4), recognizable both in the volcanic area and in the regional context (Fig. 1-1, top left), coherent with the trends of the eruptive fissures (Fig. 1-1, right) and the distribution of pyroclastic cones (1, 5). Studies of recent flank eruptions have shown preparation times lasting from months to several years (6). Modeling shows that a tensile mechanism, associated with the principal recent lateral eruptions (1989, 1991-1993, and 2001), occurred along the NNW-trending structures (6). Increases in seismicity and the inflation phases of the volcano, preceding eruptions, are usually interpreted as being due to stress changes caused by the movement and accumulation of magma. Since the 1991-1993 flank eruption, ground deformation and seismicity show a continuous dilatation of the entire edifice and a gradual increase of the seismic strain release, respectivély, suggesting a progressive accumulation of magma beneath the volcano (2, 3). There are several geophysical evidences for a shallow magma reservoir at a depth of 3 to 5 km below sea level (7, 8). These depths match the horizon of neutral buoyancy at Mount Etna, as suggested by petrological studies (9).

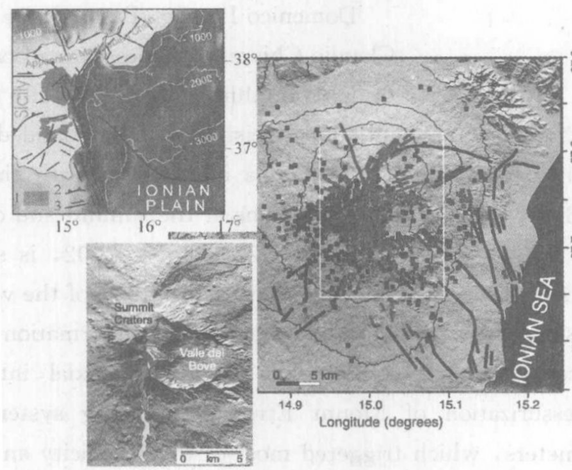

Fig. 1-1

Fig. 1-1. (Right) Structural map of Mount Etna showing eruptive fissures and major faults. Also shown are epicentral locations of the 647 best constrained earthquakes [average root mean square (rms) value < 0.1 s; average horizontal (Erh) and vertical (Erz) location errors <1 km] recorded in the period from 1994 to June 2001 and localized by the 3D velocity model of Figs. 1-2 and 1-3. The elevation contour lines at 500 m intervals are also illustrated. (Top left) Structural map of eastern Sicily. Numbers represent the following: 1, volcanics; 2, front of the Appenninic-Maghrebian Chain; and 3, main faults. (Bottom left) The eruptive fractures and the lava flows of the 18 July to 9 August 2001 flank eruption and of the 27 October 2002 flank eruption (lava flows are updated to 25 December) are shown. Lava flows of the 1999 summit eruptions are also indicated.

The size, extent, and depth of the magma chamber structure beneath Mount Etna are still poorly characterized. Recent geophysical and petrological studies (4, 10, 11), together with geochemical surveys (12), exclude the presence of a large midcrustal magma chamber. At a depth of 5 to 12 km, magma can be stored as a plexus of dikes and sills rather than as a unique magma chamber (11).

Tomographic images of Mount Etna reveal the presence of an almost aseismic high-V_P body (V_P, P-wave velocity) extended between a depth of 1 and 18 km (13), which is centered under the southern part of the Valle del Bove and also extends below the summit region. The three-dimensional (3D) velocity structure shown in Figs. 1-2 and 1-3 is from the inversion of an augmented data set (647 earthquakes recorded in the period from 1994 to 2001), which allows us to improve even the most recent results (14-16). This new inversion has been obtained by the use of Thurber's method (17) and Simul PS-14 software. Within the crust at Mount Etna, there is no evidence of a low-velocity zone interpretable as a magma chamber (18). Therefore, the most important feature revealed by tomography is the presence of a central high-velocity body (HVB), which is interpreted as a main solidified intrusive body. The HVB shows a roughly ellipsoidal shape in the upper crust (depth <10 km) with a NNW-SSE horizontal axis and a vertical axis extending between 1 and 9 km below sea level. The horizontal extension decreases with depth, from 8 to 10 km at a depth of 3 to 9 km, to 4 to 6 km below a depth of 12 km (Fig. 1-2).

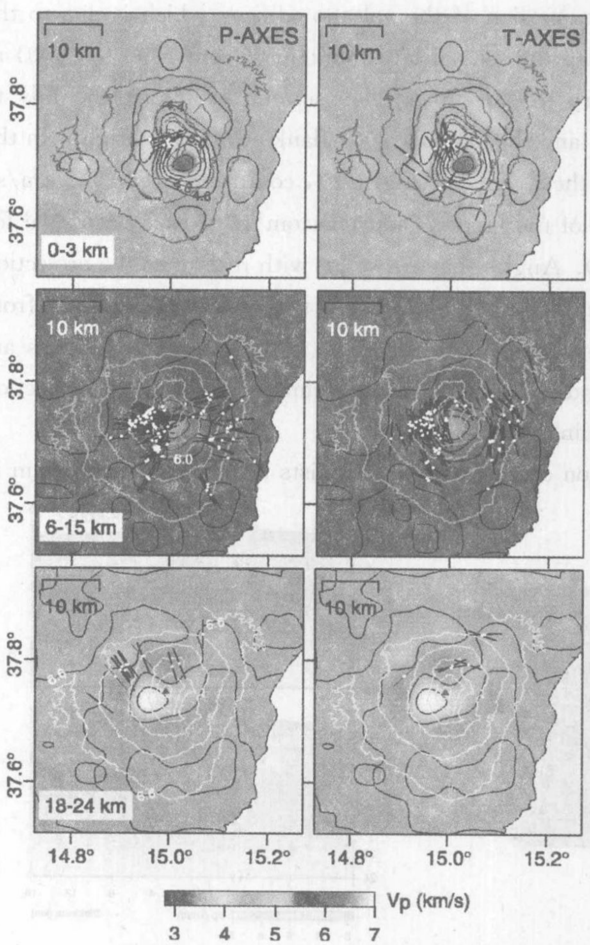

Fig. 1-2

Fig. 1-2. Horizontal projections of the (left) P-axis and (right) T-axis plots on the computed V_P model at depths of 3 (top), 12 (middle), and 18 km (bottom). P and T axes refer to earthquakes (white dots) located at depths of 0 to 3 (top), 6 to 15 (middle), and 18 to 24 km (bottom). The P axes are radial to the main central HVB. Only axes with a plunge of <30° are