

A Preliminary Discussion of Chinese Translations of “Nuclear Failsafe”

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Since the end of World War II, nuclear weapons have not been used again; however, the risk of their unauthorised, inadvertent, or mistaken use remains alarmingly high, alongside the persistent threat of deliberate use in warfare. To mitigate these risks, the concept of “nuclear fail-safe” has been proposed for all nuclear-armed states. This could lead to the adoption of unilateral, bilateral, and multilateral risk-reduction measures. In the future, dialogue and cooperation between China and the United States in this area could serve as a stepping stone for stabilising and improving Sino-US relations, while also contributing to improving global nuclear safety and security. In order to facilitate relevant discussions and advance dialogue from Track 2 to Track 1.5 or even Track 1, it is necessary to define and standardise the Chinese translation of the English term ‘nuclear failsafe’.

What does ‘nuclear failsafe’ mean?

Before determining the Chinese translation of ‘nuclear failsafe’, it is crucial to develop a correct and comprehensive understanding of the term’s meaning. According to the original definition of ‘failsafe’, the author, after consulting several mainstream English dictionaries, found that the term primarily conveys two meanings: one refers to a system designed to be foolproof and incapable of failure or malfunction, while the other describes a mechanism that automatically responds to prevent failure or malfunction.¹

Wikipedia defines ‘failsafe’ in the field of engineering as a design feature or practice that, when a component fails, automatically responds in a way that minimizes or prevents harm to other equipment, people or nearby surroundings.² For example, luggage trolleys at airports are designed with a handle that must be held in order to push the trolley. When the handle is released, the trolley automatically brakes, preventing it from going out of control and hitting others – this is an example of a failsafe design.

¹ See *Cambridge Dictionary, Merriam-Webster Dictionary, Collins English Dictionary, Britannica Dictionary*: <https://dictionary.cambridge.org/dictionary/english/fail-safe>; <https://www.merriam-webster.com/dictionary/fail-safe>; <https://www.collinsdictionary.com/dictionary/english/fail-safe>; <https://www.britannica.com/dictionary/fail%E2%80%93safe>.

² <https://en.wikipedia.org/wiki/Fail-safe>

In the field of nuclear weapons, 'nuclear failsafe' (sometimes referred to simply as 'failsafe' when 'nuclear' is omitted) primarily refers to measures designed to prevent the risk of unauthorised, inadvertent, or mistaken use of nuclear weapons.³ This involves protection against three types of risk: first, the risk of unauthorised use of nuclear weapons, such as terrorism, sabotage, and similar threats; second, the risk of inadvertent use of nuclear weapons, arising from factors such as unregulated and unprofessional human operation, as well as technical or hardware and software failures; and third, the risk of mistaken use of nuclear weapons, including misjudgment due to technical reasons, false alarms, misinformation, false information, cognitive bias, and other factors. Additionally, the 'use' of nuclear weapons covered by nuclear failsafe is not limited to their 'launch', but also includes risks such as accidental ignition, detonation, theft or loss, and accidents during transportation, storage, or training.

A range of technical, procedural and policy measures is necessary to mitigate these risks. For example, in its final report following the completion of the first US failsafe review in 1992, the Kirkpatrick Commission noted that the risk of unauthorised or inadvertent launches could be addressed by considering the desirability and feasibility of using cryptographic controls on nuclear weapon aboard submarines, and installing post-launch destruction devices on nuclear weapons.⁴ These are technical measures. To address the risk of miscalculation, the most important step is to extend the decision-making time for policymakers. If this is achieved by adjusting nuclear strategy, it qualifies as a policy measure. If the decision time is prolonged by lowering the alert status of nuclear forces, or if the risk of miscalculation is reduced by implementing a two-man policy, these are procedural measures.

In addition to unilateral precautionary measures, it is also essential for nuclear-armed states to collaborate through communication and consultation to adopt bilateral and multilateral risk reduction measures. These should include establishing rules including in new domains such as cyber, artificial intelligence, and space, setting clear red lines, adopting confidence-building measures and creating crisis communication channels, increasing the predictability of all parties' behaviour, and extending the warning and decision-making time for policymakers.

How should 'nuclear failsafe' be translated into Chinese?

After gaining the above understanding of 'nuclear failsafe', we can begin discussing its Chinese equivalent. First, it is necessary to determine whether to use sense-for-sense translation or transliteration. Some Japanese experts have suggested using transliteration, rendering 'failsafe' as “フェイルセーフ” (also written as “フェールセーフ” or “フェイルセイフ”) based on its pronunciation. In Russian, however, a sense-for-sense translation is used, with 'failsafe' translated as ‘безотказная система безопасности’, meaning a security system that is both fault-tolerant and fail-safe. According to Chinese translation conventions, sense-for-sense translation should be the preferred choice, with transliteration used only when absolutely necessary. This aligns with the translation theory of the 'Five Transliterations', proposed by the Tang Dynasty Buddhist scholar Xuanzang.

Many principles have been proposed in academia for the translation of terminology, including coherence, conciseness, unambiguity, justifiability, accuracy, readability, transparency,

³ Sam Nunn and Ernest J. Moniz: “Biden should do more to prevent the accidental launch of nuclear weapons. Here’s how.”, *Washington Post*, November 17, 2021, at <https://www.washingtonpost.com/opinions/2021/11/17/biden-should-do-more-prevent-accidental-launch-nuclear-weapons-heres-how/>

⁴ U.S. Department of Defense, “Final Report of the Federal Advisory Committee on Nuclear Risk Reduction (FARR),” 1992, at <https://documents.theblackvault.com/documents/dod/readingroom/15/622.pdf>

productivity, objectivity, stability, correctness, standardisation, discernibility, and fluency. When translating the term ‘failsafe’, the four most important principles should be followed. The first is accuracy. As with all translation, ensuring accuracy must be the primary concern. Only when a translation faithfully conveys the meaning of the original text can it be considered a good translation.⁵ The second principle is unambiguity, also known as specificity, which requires that the translated term be unambiguous. Even when the source word does not have a specific or specialized meaning – such as ‘failsafe’ – the translator should still adhere to the principle of unambiguity, ensuring the translation is a specific term without multiple meanings. The third principle is readability: the translation should be clear, straightforward, and easy to read, understand and use. The fourth principle is transparency, allowing readers to easily reverse-translate the term. When translating terminology, accuracy should always be the top priority. If accuracy, readability, or transparency cannot be balanced, accuracy should take precedence.⁶ Finally, the conventional use of the terminology should also be considered. If a term is widely used and accepted, it should be deemed correct.⁷

In terms of translation strategy, both morphological and semantic considerations can be taken into account. The morphological basis of a term refers to its syntactic structure and the derived or inflected forms that can be relied upon, while the semantic argument pertains to the theoretical meaning that underpins the creative translation of the term. Translation should first be based on the morphological structure of the source term. When the morphological structure cannot be followed, the creative translation should instead be based on the theoretical meaning conveyed by the source term.

Comparison of various suggested translations

Academia has put forward a series of suggestions for the Chinese translation of ‘nuclear failsafe’ or ‘failsafe’ so far, including “核故障安全 *he guzhang anquan* (nuclear failsafe security)”, “防意外发射 *fang yiwai fashe* (preventing accidental launch)”, “核失控安全 *he shikong anquan* (nuclear safety and security in the event of loss of control)”, “非刻意核使用安全 *feikeyi heshiyong anquan* (protection against inadvertent nuclear use)”, “故障无碍 *guzhang wuai* (no negative effect from malfunction)”, “预防失控 *yufang shikong* (preventing loss of control)”, “核武器事故后果管理 *hewuqi shigu houguo guanli* (management of consequences arising from nuclear weapon accidents)”, “失管安全 *shiguan anquan* (security against mismanagement)”, “核安全管理 *heanquan guanli* (management of nuclear safety and security)”, “多重安全装置 *duochong anquan zhuangzhi* (multiple safety devices)”, “军事核安全管理 *junshi heanquan guanli* (management of nuclear safety and security in a military context)”, “核失效保障/保护/防护 *heshixiao baozhang/baohu/fanghu* (ensuring the prevention of catastrophic consequences resulting from a failure in the nuclear system)”, “纵深防御 *zongshen fangyu* (the application of defence in depth in nuclear engineering/multi-layered safety measures)”, “核武器事故防范体系 *hewuqi shigu fangfan tixi* (a system for preventing nuclear weapon accidents)”, “耐故障 *nai guzhang* (breakdown-tolerant)”, “万无一失保障 *wanwuyishi baozhang* (ensuring that the system is foolproof)”, “故障状态确保安全 *guzhang zhuangtai quebao anquan* (ensuring the system remains safe even in the event of a breakdown)”,

⁵ Shao Junhang 邵军航, “Principles and Applications of Term Translation: A Case Study of the Chinese Translation of Cognitive Linguistics 术语翻译的原则及应用——以 Cognitive Linguistics 一书的汉译为例”, Shanghai Translation 2021, no. 161(06): 39-43.

⁶ Jiang Wangqi 姜望琪, “On the Standards of Terminology Translation 论术语翻译的标准”, Shanghai Translation, 2005, *Dictionary of Translation Studies and Translation Theory Special Issue*, 82. <https://lantrans.weebly.com/uploads/2/1/1/6/21169610/.pdf>.

⁷ Ibid.

etc. The following paragraphs will analyse the merits and shortcomings of these proposed translations, drawing on scholarly discussions and based on the four principles and translation strategy outlined above.

According to translation strategies, the above translations can be divided into two categories: those based on morphological structure and those based on semantic structure. “核故障安全 *he guzhang anquan* (nuclear failsafe security)” is the most straightforward and transparent translation based on morphological structure, with “fail” corresponding to “故障 *guzhang*” and “safe” corresponding to “安全 *anquan*”. In 2003, China National Committee for Terminology in Science and Technology approved the standard term “failsafe” as “故障安全 *guzhang anquan*”, defined as “in a redundant system, when a failure occurs, its consequences do not jeopardize the safety of the system; this represents the lowest level of redundancy technology.” It falls under the fields of aerospace science and technology, radiological medicine and protection, as well as nuclear medicine.⁸ However, in Chinese, “故障 *guzhang*” generally refers to the malfunction or problem occurring in mechanical devices, instruments.⁹ When discussing ‘nuclear failsafe’, the term ‘fail’ is not limited to machinery and instrument failures, but also includes human error, management loopholes, policy mistakes, etc. At the same time, it is also questionable whether “故障安全 *guzhang anquan*” is in line with Chinese expression habits. Therefore, many scholars believe that the translation of ‘核故障安全 *he guzhang anquan*’ is inappropriate. If we consider the principle of conventional usage, the translation of “核故障安全 *he guzhang anquan*” can indeed be adopted, with a flexible explanation of “故障 *guzhang*” in the context of nuclear weapons. However, whether this translation has reached the level of common usage remains debatable. “故障状态确保安全 *guzhang zhuangtai quebao anquan* (ensuring the system remains safe even in the event of a breakdown)” seems to be a further explanation of “故障安全 *guzhang anquan*”, but it is not concise enough as a term.

The above-suggested translations by scholars were developed through adjustments based on morphological considerations, including “核失控安全 *he shikong anquan* (nuclear safety and security in the event of loss of control)”, “非刻意核使用安全 *feikeyi heshiyong anquan* (protection against inadvertent nuclear use)”, “故障无碍 *guzhang wuai* (no harmful effects resulting from a malfunction)”, “预防失控 *yufang shikong* (preventing loss of control)”, “失管安全 *shiguan anquan* (security against mismanagement)”, “核失效保障/保护/防护 *heshixiao baozhang/baohu/fanghu* (ensuring the prevention of catastrophic consequences resulting from a failure in the nuclear system)”, “耐故障 *nai guzhang* (breakdown-tolerant)”, “万无一失保障 *wanwuyishi baozhang* (ensuring that the system is foolproof)”.

Some of the proposed translations attempt to encompass concepts such as instrumental malfunction, human error, and management loopholes in one appropriate Chinese term. These include terms such as “失控 *shikong*” (loss of control), “失管 *shiguan*” (mismanagement), “失效 *shixiao*” (loss of effectiveness), “非刻意核使用 *feikeyi heshiyong*” (inadvertent nuclear use), and “万无一失 *wanwuyishi*” (foolproof). Other translations, such as “无碍 *wuai*” (no harming effect), “预防 *yufang*” (prevention), “保障 *baozhang*” (safeguard), “耐 *nai*” (-tolerant), focus more on the “safe” part (in failsafe) and its collocational patterns in Chinese. Some scholars believe that both mechanical breakdown and issues caused by human error, procedures, or policies fall under the category of “失控 *shikong* (loss of control)”. Other scholars argue that the scope of ‘nuclear failsafe’ is broader than “失管 *shiguan* (mismanagement)” and “失效 *shixiao*”(loss of effectiveness),

⁸ Available for reference on the “Termonline” website authorised by China National Committee for Terminology in Science and Technology, <https://www.termonline.cn/wordDetail?termName=%E6%95%85%E9%9A%9C%E5%AE%89%E5%85%A8&subject=14b3e9a926b011ee93dab068e6519520&base=1>

⁹ Contemporary Chinese Dictionary (*Xiandai Hanyu Cidian*), 7th ed. (Beijing: The Commercial Press, 2018), 472.

and that the contexts are different. Besides, “非刻意核使用 *feikeyi heshiyong* (inadvertent nuclear use)” only addresses part of the issues that ‘nuclear failsafe’ aims to mitigate.

Other translations suggested by scholars follow semantic considerations, that is, based on the concept of ‘failsafe’, to try to create a Chinese term that can reflect the connotation of the concept while covering its extension as much as possible. These include “防意外发射 *fang yiwai fashe* (preventing accidental launch)”, “核武器事故后果管理 *hewuqi shigu houguo guanli* (management of consequences arising from nuclear weapon accidents)”, “核安全管理 *heanquan guanli* (management of nuclear safety and security)”, “多重安全装置 *duochong anquan zhuangzhi* (multiple safety devices)”, “军事核安全管理 *junshi heanquan guanli* (management of nuclear safety and security in a military context)”, “纵深防御 *zongshen fangyu* (the application of defence in depth in nuclear engineering/multi-layered safety measures)”, and “核武器事故防范体系 *hewuqi shigu fangfan tixi* (a system for preventing nuclear weapon accidents)”. Some scholars point out that, “防意外发射 *fang yiwai fashe* (preventing accidental launch)” should be part of ‘nuclear failsafe’, but it cannot represent the whole. The concept of “核安全 *heanquan* (nuclear safety and security)” differs significantly from “nuclear failsafe”, as it is more focused on the safety of civilian nuclear energy, the prevention of accidents involving nuclear materials and facilities, and mitigating radioactive consequences. “nuclear failsafe” refers to multiple security “measures”, rather than “devices”, and therefore “多重安全装置 *duochong anquan zhuangzhi* (multiple safety devices)” is also not an accurate translation. The controversy surrounding the term “核武器事故后果管理 *hewuqi shigu houguo guanli* (management of consequences arising from nuclear weapon accidents)” lies in the fact that “nuclear failsafe” primarily focuses on accident prevention, rather than managing their aftermath.)”.¹⁰ “纵深防御 *zongshen fangyu* (the application of defence in depth in nuclear engineering/multi-layered safety measures)”, as a term that refers to military strategies, has been applied to the civilian nuclear power sector, including the “five levels of

¹⁰ The Nuclear Safety Law of the People’s Republic of China stipulates that “[it] applies to activities within the territories and other maritime areas under the jurisdiction of the People’s Republic of China concerning the adoption of preventive, protective, mitigating, regulatory, and other safety measures for nuclear facilities, nuclear material, and related radioactive waste; the prevention of nuclear accidents caused by technical factors, human factors, or natural disasters; and the reduction of the radiological consequences of nuclear accidents to the best extent possible.” https://www.mee.gov.cn/ywqz/fqgz/fl/202110/t20211028_958223.shtml

The International Atomic Energy Agency (IAEA) definitions of “nuclear safety” and “nuclear security” differ significantly from “nuclear failsafe.” “Nuclear safety” means “The achievement of proper operating conditions, prevention of accidents and mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation risks”, while “nuclear security” refers to “The prevention and detection of, and response to, criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities or associated activities”. *IAEA Nuclear Safety and Security Glossary, 2022* (Interim) Edition, <https://www-pub.iaea.org/MTCD/Publications/PDF/IAEA-NSS-GLOweb.pdf>.

defence”.¹¹ Scholars noted that, although “纵深防御 *zongshen fangyu*” in this perspective is similar to the above-mentioned scope of “nuclear failsafe”, it stems originally from the military language – the application in the civilian nuclear power sector is an appropriation of the military strategy concept. If it reverse-directs to the military context again, it risks violating the principle of unambiguity and easily leading to misunderstanding. The inadequacy of the translation of “核武器事故防范体系 *hewuqi shigu fangfan tixi* (a system for preventing nuclear weapon accidents)” stems from several issues. On the one hand, it is unclear whether a category of ‘nuclear weapon accidents’ exists outside the scope of nuclear failsafe prevention as understood in Chinese; on the other hand, depending on the specific context, “failsafe” may refer to a specific measure, a plan, or a comprehensive safeguard system, making the term “体系 *tixi* (system)” in the translation overly rigid. Further, these translations lack semantic transparency, making it challenging for readers to reverse-translate back to the source word at once.

Going forward, Chinese scholars could further discuss and determine an appropriate Chinese translation for ‘nuclear failsafe’ based on the discussions above. They could also engage in discussions with scholars from Japan and South Korea to agree on a term derived from Chinese characters (Kanji/Hanja) that would be suitable for all three countries.

¹¹ According to China Atomic Energy Authority, implementing the defence-in-depth concept refers to: “Five lines of defense have been set up under which the nuclear emergency preparedness threshold is moved ahead and multiple barriers are installed to strengthen nuclear safety, prevent accidents and mitigate the consequences of an accident. The five lines of defense are: First, the quality of design, manufacturing, construction and operation shall be assured to prevent deviation from normal operation; second, operation procedures and operation technical specifications shall be rigorously followed and observed to ensure that each nuclear generating unit is operated within the defined safety range, any deviations therefrom are detected and corrected in a timely manner, and any abnormal operation is controlled to prevent it from evolving into an accident; third, in case a deviation fails to be corrected in a timely manner, plant safety and protection systems shall be automatically activated upon occurrence of an accident within the design datum, and emergency operations shall be organized to prevent the situation deteriorating; fourth, in case an accident fails to be controlled effectively, accident handling procedures shall be activated with the accident management strategy enforced to ensure that the containment shall remain intact and no radioactive substances are released into the environment; and fifth, in the event of failure of the above-mentioned lines of defense, off-site emergency actions shall be immediately activated in an effort to minimize any impact from the accident on the public or the environment. Meanwhile, multiple physical barriers shall be set up to ensure that multiple lines of defense are in place to prevent and control release of radioactive substances into the environment.” See: Full text of China’s Nuclear Emergency Preparedness, China Atomic Energy Authority, <https://www.caea.gov.cn/english/n6759377/c6793126/content.html>

“Nuclear Failsafe”中文术语译名初探

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尽管自二战结束以来，人类一直没有再次使用核武器，但除了存在战争中刻意使用核武器的潜在可能性以外，非授权、非刻意或错误使用核武器的风险也非常大。为了防范这些风险，“nuclear failsafe”这一概念被提了出来。这可能会推动有核国家采取单边、双边及多边风险减排措施。未来中美两国在这一领域的对话与合作，有望成为稳定与改善中美关系的垫脚石，也有利于提升全球核安全。为了便于相关讨论的展开，推动相关对话从二轨提升到1.5轨甚至一轨，有必要确定和统一“nuclear failsafe”这一英文术语的中文译名。

什么是 nuclear failsafe?

在确定nuclear failsafe的中文译名之前，首先应对该术语的概念有正确、完整的认识。就failsafe这一英文词语的本意而言，笔者查询几种主流英语词典后发现，该词主要包括两方面的含义。一是表示万无一失，不可能失败或发生故障；二是指带有某种功能，可以自动应对可能引发失败或故障的情况。¹《维基百科》显示，工程领域的failsafe是指某种设计特征或做法，当设计特征发生故障时，其固有的反应方式会将对其他设备、环境或人员造成的伤害降到最低或不造成伤害。²例如，机场的行李推车需要手握把手才推得动推车，如果放开把手，推车就会自动刹车，这种设计可以防止推车失控撞到他人，就是一种failsafe。

在核武器领域，nuclear failsafe（有时省略“nuclear”，仅称“failsafe”）主要是指采取措施预防非授权（unauthorized）、非刻意（inadvertent）或错误（mistaken）使用核武器的风险。³这涉及到防范三类风险：一是非授权使用核武器的风险，如恐怖主义、蓄意破坏等。二是非刻意使用核武器的风险，如人为操作不规范、不专业，技术或软硬件故障等因素产生的核风险。三是误用核武器的风险，包括因技术原因、虚警、错误信息、虚假信息、认知偏差等导致误判而带来的风险。另一方面，nuclear failsafe所涉及的核武器“使用”风险，不仅限于核武器的“发射”，也包括点火、引爆、失窃或丢失，以及运输、储存、训练等过程中出现的意外风险。

¹ 参见《剑桥词典》《韦氏词典》《柯林斯词典》《大不列颠词典》等，网址：<https://dictionary.cambridge.org/dictionary/english/fail-safe>; <https://www.merriam-webster.com/dictionary/fail-safe>; <https://www.collinsdictionary.com/dictionary/english/fail-safe>; <https://www.britannica.com/dictionary/fail%E2%80%93safe>。

² <https://en.wikipedia.org/wiki/Fail-safe>

³ Sam Nunn and Ernest J. Moniz: “Biden should do more to prevent the accidental launch of nuclear weapons. Here’s how.”, *Washington Post*, November 17, 2021, at <https://www.washingtonpost.com/opinions/2021/11/17/biden-should-do-more-prevent-accidental-launch-nuclear-weapons-heres-how/>

为了避免这些风险，需要采取一系列技术、程序和政策上的措施。例如，柯克帕特里克委员会在1992年完成美国首次“failsafe 检查”（failsafe review）后的最终报告中指出，针对非授权或非刻意发射的风险，可考虑在核潜艇上使用核武器加密控制装置、在核武器上安装发射后摧毁装置的可取性和可能性，⁴这就是技术措施。针对误判风险，最重要的是要延长决策者的决策时间。如果通过调整核战略来延长决策时间，这就是政策措施。通过降低核力量戒备状态级别来延长决策时间，通过双人政策（Two-Man Policy）来降低误判风险，就是程序措施。

除了单方面采取防范措施以外，有核国家也有必要通过沟通协商，共同采取双边和多边风险减降措施，建立包括网络、人工智能和太空等新领域的核规则，划清红线，采取信任建立措施和危机沟通渠道，提高各方行为的可预测性，并延长决策者的警告和决策时间。

如何将“nuclear failsafe”译成中文术语？

在形成对nuclear failsafe的上述理解后，我们来讨论该术语的中文对应表达。首先需要确定采用意义还是音译。日语采用的是音译，按读音将failsafe译成“フェイルセーフ”（フェールセーフ、フェイルセイフ）。俄语采用的则是意译，按其概念译为“безотказная система безопасности”，意为“无故障、不失效的安全系统”。根据汉语的翻译习惯，应首选意译，只有不得已时，才使用音译，即唐代玄奘提出的“五不翻”。

对于术语翻译，学界提出过不少原则，如系统性、简洁性、单义性、理据性、准确性、可读性、透明性、能产性、客观性、稳定性、正确性、规范性、可辨性、通顺性等。⁵在翻译failsafe这一术语时，应遵循最重要的四项原则。一是准确性，术语翻译和一切翻译一样，首先要确保准确性。一个译名只有能准确传递原文的意思，才是好译名。⁶二是单义性，或称专用性，要求术语的译文是没有歧义的单义词语。即使在源词不具有专用性的情况下——failsafe就属于这种情况，翻译时也应遵循单义性原则，将其翻译为专用的单义词。⁷三是可读性，即易读、易懂，清晰明了，便于使用。四是透明性，使读者能从译名轻松回译。翻译术语时，必须把准确性放在首位。当准确性和可读性、准确性和透明性不能兼顾时，我们主张“宁准而不可读”⁸、“宁准而不透明”。在此基础上，也应考虑术语的约定俗成性，“只要大多数人这么用，它就是正确的”⁹。

在翻译策略上，可考虑使用形态-语义理据。能依据的句法结构和派生或屈折变化形式是术语的形态理据，而对术语进行创译时所依据的理论意义就是术语的语义理据。¹⁰首选根据源词的形态理据进行翻译，当无法依据源词的形态理据进行翻译时，则依据源词所指称的理论意义进行创译。

⁴ U.S. Department of Defense, “Final Report of the Federal Advisory Committee on Nuclear Risk Reduction (FARR),” 1992, at <https://documents.theblackvault.com/documents/dod/readingroom/15/622.pdf>

⁵ 邵军航，术语翻译的原则及应用——以Cognitive Linguistics一书的汉译为例[J]，上海翻译，2021，No.161(06):39-43.

⁶ 姜望琪，论术语翻译的标准，上海翻译，（2005）翻译学词典与翻译理论专辑，P80. <https://lantrans.weebly.com/uploads/2/1/1/6/21169610/.pdf>

⁷ 邵军航，术语翻译的原则及应用——以Cognitive Linguistics一书的汉译为例[J]，上海翻译，2021，No.161(06):39-43.

⁸ 姜望琪，论术语翻译的标准，上海翻译，（2005）翻译学词典与翻译理论专辑，P82. <https://lantrans.weebly.com/uploads/2/1/1/6/21169610/.pdf>

⁹ 同上。

¹⁰ 邵军航，术语翻译的原则及应用——以Cognitive Linguistics一书的汉译为例[J]，上海翻译，2021，No.161(06):39-43.

对多种译名建议的比较

目前学术界对“nuclear failsafe”或“failsafe”的中文译名提出了一系列建议，包括“核故障安全”“防意外发射”“核失控安全”“非刻意核使用安全”“故障无碍”“失控安全”“预防失控”“核武器事故后果管理”“失管安全”“防失控安全”“核安全管理”¹¹“多重安全装置”¹²“军事核安全管理”“核失效保障”“核失效防护”“纵深防御”“核武器事故防范体系”“失效保护”“失效保障”“耐故障”“万无一失保障”“故障状态确保安全”等。下面，我们结合学者讨论，根据术语翻译的上述四项原则和翻译策略，对这些译法建议的可取性和不足之处作简要分析。

按照翻译策略，上述译名可分为依据形态理据和依据语义理据两类。“核故障安全”是最直接、最透明的依据形态理据译出的译名，“fail”对应“故障”，“safe”对应“安全”。全国科学技术名词审定委员会在2003年就已审定“failsafe”的规范用词为“故障安全”，定义为“在冗余系统中当出现故障时，其后果不危及系统的安全，是冗余技术中的最低等级”，属于航空科学技术名词、放射医学与防护名词、核医学名词。¹³但是，中文中的“故障”一般指“（机械、仪器等）发生的障碍或毛病”¹⁴，而我们在讨论“nuclear failsafe”时所涉及的“fail”不仅限于机械仪器故障，也包括人为失误、管理漏洞、政策失误等。同时，“故障安全”是否符合中文表达习惯也受到质疑。因此，不少学者认为“核故障安全”这一译名欠妥。若考虑约定俗成原则，确实可采用“故障安全”的译法，而对核武器相关语境下的“故障”概念作灵活解释，但该译名是否已达到约定俗成的程度仍有待讨论。“故障状态确保安全”似乎是对“故障安全”的进一步解释，但作为术语不够简洁。

学者建议的上述部分译名是在形态理据基础上进行调整而得出的，包括“核失控安全”“非刻意核使用安全”“故障无碍”“预防失控”“失管安全”“防失控安全”“核失效保障”“核失效防护”“失效保护”“失效保障”“耐故障”“万无一失保障”。其中，一些译名根据“nuclear failsafe”的概念，试图用一个合适的汉语词语把设备故障、人为失误、管理漏洞等等都囊括在内，包括“失控”“失管”“失效”“非刻意核使用”“万无一失”等；另一些译名则更注重“safe”一词的含义和汉语搭配习惯，将其调整为“无碍”“预防”“保障”“耐”。一些学者认为，无论是设备导致的故障，还是人为、程序、政策带来的问题，都属于“失控”。另学者认为，nuclear failsafe所讨论的内容比“失管”“失效”更丰富，且语境不同；而“非刻意核使用”仅仅是nuclear failsafe需要应对的部分问题。

学者建议的其他译名则采用语义理据，即根据“failsafe”的概念，试图创造一个可以体现该概念内涵同时又尽量涵盖其外延的中文术语，包括“防意外发射”“核武器事故后果管理”“核安全管理”“多重安全装置”“军事核安全管理”“纵深防御”“核武器事故防范体系”。有学者指出，“防意外发射”应当是nuclear failsafe的一部分，但不能代表其全部。“核安全”的概念与nuclear failsafe有很大的差异，更多倾向于民用核能安全、预防核材料核设施事故、减轻放射性后果。¹⁵nuclear failsafe 是多重安全措施，而非“装置”，因此“多重安全装置”这一译名也不合适，即使改为“多重安全措施”，也过于宽泛。“核武器事故后果管理”这一译名的争议则在于，nuclear failsafe主要是为了防止事故发生，而并非

¹¹ 一些韩国专家建议将failsafe译成“核安全管理”。

¹² 一些日本专家建议将failsafe译成“多重安全装置”。

¹³ 可在全国科学技术名词审定委员会授权的“术语在线”网站上查询，网址：<https://www.termonline.cn/wordDetail?termName=%E6%95%85%E9%9A%9C%E5%AE%89%E5%85%A8&subject=14b3e9a926b011ee93dab068e6519520&base=1>

¹⁴ 《现代汉语词典》第7版，p472，商务印书馆，2018年。

¹⁵ 《中华人民共和国核安全法》（2017年9月1日第十二届全国人民代表大会常务委员会第二十九次会议通过）规定了“对核设施、核材料及相关放射性废物采取充分的预防、保护、缓解和监管等安全措施，防止由于技术原因、人为原因或者自然灾害造成核事故，最大限度减轻核事故情况下的放射性后果的活动”。网址：https://www.mee.gov.cn/ywgz/fgbz/fl/202110/t20211028_958223.shtml。国际原子能机构（IAEA）对“nuclear safety”和“nuclear security”的定义也与nuclear failsafe相去甚远，“nuclear safety”是指“实现适当的运行条件，防止事故或减轻事故后果，从而保护工人、公众和环境免受不必要的辐射风险”，“nuclear security”是指“预防、发现并应对涉及或针对核材料、其他放射性材料、相关设施或相关活动的犯罪或蓄意非授权的行为”。IAEA Nuclear Safety and Security Glossary, 2022 (Interim) Edition, 网址：<https://www-pub.iaea.org/MTCD/Publications/PDF/IAEA-NSS-GLOWeb.pdf>。

等事故发生后采取措施来应对其后果。“纵深防御”这一原军语已被应用于民用核电站领域，包括“五道防线”¹⁶。一些学者指出，核电站的“纵深防御”概念，确实跟我们讨论的“failsafe”概念比较接近，但该词源自军语，用于核电站领域时是对该军语概念的借用和引申，如果二次借用回军事领域，就违反了专业术语的单义性原则，容易引起很大的误会。“核武器事故防范体系”这一译名的不足之处在于，一方面汉语所理解的“核武器事故”是否存在不属于nuclear failsafe防范范畴的类别，还有待进一步讨论；另一方面，根据不同具体语境，failsafe可能指某一种措施或方案，也可能指由一系列措施组成的保障体系，因此称之为“体系”就不够灵活。此外，依据语义理据译出的译名透明性较差，让读者很难一下子回译到源词。

未来中方学者可在上述讨论的基础上，进一步商议确定nuclear failsafe的中文译名。中方学者也可与日韩学者进行讨论，商定一个适用于中日韩三国的汉字译名。

¹⁶ 据中国国家原子能机构官网显示，核电站的设计、建造和运行，采用了纵深防御的原则，从设备上和措施上提供多层次的重叠保护，确保放射性物质能有效地包容起来不发生泄漏。纵深防御包括以下五道防线：

第一道防线：精心设计，精心施工，确保核电站的设备精良。有严格的质量保证系统，建立周密的程序，严格的制度和必要的监督，加强对核电站工作人员的教育和培训，使人人关心安全，人人注意安全，防止发生故障。

第二道防线：加强运行管理和监督，及时正确处理不正常情况，排除故障。

第三道防线：设计提供的多层次的安全系统和保护系统，防止设备故障和人为差错酿成事故。

第四道防线：启用核电站安全系统，加强事故中的电站管理，防止事故扩大。

第五道防线：厂内外应急响应计划，努力减轻事故对居民的影响。有了以上互相依赖相互支持的五道防线，核电站是非常安全的。

网址：<https://www.caea.gov.cn/n6760341/n6760359/c6827164/content.html>