

Preface

Nuclear engineering deals with quite a wide scope of knowledge including mathematics, physics, chemistry, thermodynamics, heat transfer, fluid flow, electricity, instrument and control, materials, chemical engineering, mechanicals, nuclear physics, reactor theory and radiation protection. Each of these fields has some fundamental principles related to nuclear engineering. This textbook focuses on those fundamental principles and makes them a whole system knowledge to understand nuclear engineering.

Nuclear energy is a kind of clean, safety, economical energy source and it is one of the best choices of future energy for the whole world. It is especially suitable for China to develop nuclear energy because of the environmental pressure caused by fossil fuel. Nuclear energy provides about 15% of the electrical power of the whole world at present. Although, there were some nuclear accidents in the history of nuclear industry, advanced nuclear power plants are more and more safety, more and more efficiency, and anti-nuclear proliferation. At present, the Chinese government is working hard to adjust the structure of energy source. Nuclear energy, wind energy, hydro energy and solar energy are developing very quickly. Based on the plan of the government, the capacity of nuclear power plant in China will be 360 GWe, 240 GWe or 120 GWe according to different level of the development.

Based on these backgrounds, human resources of nuclear engineering will be demanded continually. Nuclear engineering deals with quite a wide scope of knowledge. For those who changed major to nuclear engineering, it is a little bit of difficult to understand the whole system knowledge in nuclear engineering field. Even for those who learn nuclear engineering as major, it is necessary to learn all these materials on the point view of systematic.

If the knowledge learned is not comprehensive, it is definitely a hidden danger for nuclear safety. All persons who want to work in the nuclear engineering field will be trained before entering a nuclear power plant. This

textbook is a kind of handbook because of its simplicity, systematic and easy to understand. There are bunch of diagrams and figures to understand those profound concepts without tedious derivation of formulas.

The textbook is structured in twelve chapters, beginning with the basic concepts of mathematics and physics, and continuing in Chapter 2 with thermodynamics. Chapter 3 is concerned with heat transfer. Chapter 4 discusses the principles of fluid flow. Electrical science is introduced in Chapter 5. Instrumentation and control is discussed in Chapter 6. In Chapter 7, the fundamental principles in chemistry and chemical engineering are presented. Chapter 8 is concerned with material science and Chapter 9 with mechanical science. Nuclear physics and reactor theory will be learned in Chapter 10 and Chapter 11 and radiation protection in the last.

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