

Preface

Information technology (IT) is being used in our lives widely. Today, we cannot live without many kinds of communication devices like the smart phone, iPhone, or desktop computer. Therefore, it is important to make use of the skills of IT in the specified industry. IT has a critical role in the nuclear industry. The nuclear industry has developed for more than half a century; nuclear energy supplies have been accomplished in some countries and other nations would like to construct new nuclear power plants (NPPs). Thus IT could impact the nuclear industry significantly.

This book gives the data estimations in the aspects of safety and economy in the nuclear market. Although IT is usually defined as hardware and software, there are data manipulations which are crucial strategies of NPPs. Safety is a traditional topic of nuclear study. This is expressed in this book as the nonlinear algorithm for artificial intelligence and business management tools. The fuzzy set theory, neural network theory, genetic algorithm, and system dynamics (SD) have been used for the quantification of relevant accident scenarios. The severest accidents are well known in the industry as Three Mile Island (TMI), Chernobyl, and Fukushima cases where devastating damages had affected to the public. This indicates that electrical power shortages as well as radiation hazards are simultaneously in turmoil. Hence, the economy and safety are closely related, although they are in adverse positions. If the safety enhancement investment increases, the economy of the plant will decrease. However, the accident possibility of power production could decrease. We know very well that reasonable compensation of safety and economy is extremely important in the management of NPPs. But, in the case of the Fukushima accident, it was impossible to prepare for the accident, because the Richter scale of the earthquake was 9.0 which was more than the designed scale of 6.5. So, assessments in safety or economy should give suggestions, predictions, or other kinds of opinions. The current technology, unfortunately, cannot estimate exactly natural disasters like the case of the Fukushima NPP. It is needed to design how to control the disaster. This book can give the reader a hint for solution of the unexpected events. Non-linear logics that are used for the imaginations of accident scenarios, are expressed in this book.

There are several example topics in this book. These can be applied to many kinds of stuffs. In future, the most developed technology in IT could save the NPPs from the devastating accidents like the previous three cases. For example, real-time safety assessment is easily possible using the portable communication system. In addition, the hologram communication could give the visualized data processing easily.

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