

# Preface

Nuclear fusion, especially D-T fusion, is considered to be a promising approach for deriving energy in the future, regarded as a clean, safe and ultimate energy resource. Fusion neutronics is an important branch of fusion energy research, which focuses on studying the behavior and evolution of fusion neutrons. Over the past several decades, great progress has been made in this area covering neutronics theories and methodologies, fusion reactor design, and neutronics experiments. Nevertheless, there is still lack of a dedicated book to introduce fusion neutronics.

The author and his team (known as the FDS Team) have been engaged in fusion neutronics-related research since the 1980s. With the achievements and experiences accumulated over these years, this book was written to present a comprehensive introduction to fusion neutronics covering all the related key topics, including fundamental theories, methodologies, and experiments as well as fusion system designs. This book consists of three parts, with 13 chapters in total. The first part starts with an introduction to neutron transport theory, then describes the principles of neutrons interacting with materials and their impacts on fusion systems, personnel, the public and the environment, and finally focuses on comprehensive simulation related to neutron behaviors. The second part of this book is dedicated to neutronics design principles of fusion systems and illustrates the application of the corresponding theories and methodologies introduced above, with examples of ITER, FDS-I and FDS-II. The last part of this book introduces technologies of fusion neutronics experiments, including fusion neutronics experiment methods and typical experimental facilities in the world. Besides, the current status and development trend of fusion neutronics experiments are also illustrated.

In addition to the achievements obtained by the author, this book also absorbs the most advanced and important results in this area all over the world, so as to enrich the contents and provide a systematic and comprehensive framework of fusion neutronics. Furthermore, various representative examples are given to illustrate the neutronics design principles, methodologies and technologies of fusion systems. This book is intended to serve as a textbook for graduate students and senior undergraduates, and also as a reference book for those working in the

area of fusion research. With all these efforts, the author hopes that readers will find this book interesting and beneficial to their studies and research.

Finally, this book is dedicated to the Institute of Nuclear Energy Safety Technology (INEST), Chinese Academy of Sciences (CAS), to celebrate its fifth anniversary.

Hefei, China  
June 2016

Prof. Yican Wu  
Director General  
Institute of Nuclear Energy Safety Technology  
Chinese Academy of Sciences

Fusion Neutronics

Wu, Y.

2017, XX, 393 p. 192 illus., 110 illus. in color.,

Hardcover

ISBN: 978-981-10-5468-6