

tures prevailing in the plasma edge region, the edge plasma composition contains significant fractions of neutral hydrogen and low-charged atomic and molecular impurities produced in plasma–wall interactions. The range of collision processes involving plasma electrons and ions, hydrogenic neutrals, and wall impurities is extremely large. The most important of these processes, from the standpoint of their effects on plasma edge properties and behavior (e.g., ionization balance, plasma energy and momentum losses, plasma transport, etc.), are the electron impact excitation and ionization of plasma edge atoms, ions, and molecules, electron–ion recombination, elastic and momentum transfer collisions of plasma electrons and ions with the plasma edge neutrals, dissociative processes in electron–molecule (molecular ion) collisions, electron capture in ion–atom (molecule) collisions, and energy transfer and reactive ion–molecule collisions.

This book contains an account of the most important atomic and molecular processes taking place in fusion edge plasmas and of the spectroscopic characteristics of edge plasma constituents. Each chapter describes the basic physics of a specific type or class of processes, gives an overview of the current research on the subject, and presents a significant amount of quantitative information on the characteristics of the processes considered, including the results of most recent research. The primary purpose of this book is to provide the fusion plasma researchers with a source of critically assessed information on atomic and molecular processes in edge plasmas. This information is indispensable in the interpretation of experimental observations and in the modeling and diagnostics of fusion edge plasmas. It is hoped, however, that the information presented can also be useful to the researchers in atomic collision physics, providing them with an overview of spectroscopic and atomic collision data needs in controlled fusion research.

It is a great pleasure to express my deep gratitude to all contributors to this volume for their dedicated effort and friendly cooperation in mastering the content of individual chapters and ensuring the comprehensive character of the book.

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