

# Preface

The geostationary satellite should fly along a special orbit occupying a very limited region which is confined by the satellite longitude above the equator of the Earth. In order to utilize the limited orbit resources efficiently, the satellite is required to be maintained in a dedicated position, and what is more, sometimes it is collocated with two or more satellites sharing the same location. As a result, a safety collocation strategy needs to be deployed to diminish collision risks of the collocated satellites.

The main strength of this work is targeted at the latest scientific questions and engineering requirements arising from the maintenance for geostationary satellites resided in narrow allocative positions, and collocated geostationary satellites operated by the same or different organizations. There are some publications related to those topics in recent years, some of those investigations are referenced in this book.

*Peter Berlin (2004) The Geostationary Application Satellite* is a comprehensive investigation about the satellites in geostationary orbit, which covers the space environment and mechanisms of orbit and attitude of geostationary satellite, the structure including thermal, power, propulsion, and application payload, as well as telemetry, tracking and command system.

*Donald Jansky (1987) Communication Satellite in the Geostationary Orbit* is a monograph about geostationary satellite application, which focuses on signal processing and payload designation as a key spot in space communication.

*Hephaestus Book (2009) Artificial Satellites in Geosynchronous Orbit* represents a new publishing paradigm, which collects disparate materials about geosynchronous orbit into a cohesive informative book; some contents come from Wikipedia articles and related comments.

*E. M. Soop (1994) Handbook of Geostationary Orbits* is a masterpiece by honored Professor Soop, who had got good relationship with the organization the author backed. This book covers the orbit perturbation and practical maneuver related resources for geosynchronous satellite, and details of orbit correction techniques for maintaining of ESA's satellites.

*Li H. N. (2010) Geostationary Satellite Orbit Analysis and Collocation Strategies* was published in Chinese by the National Defense Industry Press in 2010. The contents focus on the orbit perturbation analysis for the geostationary orbit, and the mathematical and physical principle of orbit maneuver and collocation strategies for multi-geostationary satellites. After receiving some professional reviews and readers's comments for this work, I always think I'd had a chance to respond those constructive advises and to reflect the latest engineering requirements. A chance's coming, the China News Press Association has announced this work was nominated to publish internationally funded by China Classical International Publish project (2014).

The book targets at the latest scientific questions and engineering requirements arising from the maintenance of geostationary satellites resided in narrow allocative positions, and collocated geostationary satellites operated by the same or different organizations. It aims to find solutions for deploying a safe and reliable collocation control. It focuses on the dynamic foundations of geostationary orbit, the orbit perturbation analysis on geostationary satellites, as well as the physical principles of orbit maneuvers explained in mathematics, which are available to engineers of different backgrounds to have the initiative to penetrate with knowledge that encourages the insight for engineering solutions. Moreover, the book presents some practical techniques and mathematical models to help readers master the corrective method for planning maneuvers of geostationary satellite station keeping. Engineers and scientists in the fields of aerospace technology and space science can benefit from this work.

The author is grateful in particular to China Xi'an Satellite Control Center (XSCC), which made this book possible by giving permission for the publication of the development results, and the State Key Laboratory of Astronautic Dynamics (ADL) for providing financial and administrative support, with which the author is affiliated. XSCC has operated four pairs of satellites sharing the same longitude slot respectively for each pair, and in addition, a satellite of XSCC is collocated with a Russian and a Japanese satellite, the three sharing the same longitude slot, which serves as an engineering background to fully ascertain the solutions mentioned in this book.

Special thanks are given to Xin Lei, Dong WeiHua and Wang RongHui for their effort in performing some translation and word processing for the manuscript. The book has also greatly benefited from the assistance of many colleagues, who have provided the book with invigorating discussions during the time that the book was being prepared, as well as helpful suggestions and constructive reviews when the book is finished. In addition, the author wishes to express his sincere gratitude to Yuan Jing for being such a supportive and understanding wife during a long time, without which the book could not have been written. Last but not least, the final acknowledgement is to the publisher's reviewer, who has provided encouragement and useful comments to the book.

Xi'an, China  
September 12, 2012

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Geostationary Satellites Collocation

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2014, X, 334 p. 212 illus., 12 illus. in color., Hardcover

ISBN: 978-3-642-40798-7