

# Preface

According to their working principle, gyroscopes can be divided into either electromechanical gyroscopes or optical gyroscopes. Electromechanical gyroscopes include the ball bearing gyroscope, the liquid floated gyroscope, the flexible gyroscope, the electrostatic gyroscope, the piezoelectric gyroscope, the airstream gyroscope and the micromechanical gyroscope, while optical gyroscopes include the laser gyroscope and the optical fiber gyroscope. At present the laser gyroscope and the optical fiber gyroscope have seen the fastest development.

Electromechanical gyroscopes can be also be divided into two type according to their structure, namely driven gyroscopes and non-driven gyroscopes. The former have been successively developed and put into use in developed countries such as the United States, Japan and in China, while the latter has fewer patent and reports at home and abroad. Non-driven micromechanical gyroscope appears such that the gyroscope is expanded from a kind of driven structure to two kinds of the driven structure and the non-driven structure.

A non-driven micromechanical gyroscope has a simple structure, low cost and high reliability. Its biggest advantage is that it can perceive the transverse angular velocity and the rolling angular velocity of the rotating flight carrier simultaneously, that is, it has the function of two driven micromechanical gyroscopes, which greatly reduces cost. Over the last ten years, the non-driven micromechanical gyroscope has been successfully developed and used for rotating carriers in China. A total of 29 invention patents has been licensed relating to the non-driven micromechanical gyroscope in China, Britain, France, Germany and America. It has won one first prizes and five second prizes on the Provincial Technological Invention Awards, 149 papers have been published in domestic and foreign academic journals and at academic conferences. This book describes this gyroscope and its application in detail.

During the writing of this book, Wang Jianguang of China Aerospace Science and Technology Corporation carefully reviewed the revised book and Prof. Li Yaozong provided the translation of the foreign sources in Part 1. My doctoral candidates, namely Yan Qingwen, Wang Hongwei, Mao Xu, Wu Lifeng, Liu Yu, Zhao Hui, Zhang Zengping and Wang Ling, and my postgraduates, namely Zhang Nan, Xu

Xiaosong, Sun Chengxiang, Xu Hongzhuo, Liu Hailin, Wen Jiangchuan, Ye Qing, Yue Guannan, bright, Jiang Shiyu, Wang Ling, Zhao Qifeng, Lin Xia, Qin Shengjie and Yu Xiaolong talk, Dan Yanfeng, Guo Heng, Wan Pinjun, Meng Dong, happy, Ma section, Gao Yinjuan, Zhang Ning, Liu, Yuan Min, Xu Hongwei, Qiao Li and Zhao Haixiao, have participated in the development of non-driven micromechanical gyroscopes and their applications or the proofreading of the manuscript and the fruits of their labor are included in this book. I would like to express my deep gratitude to them.

Many technical problems relating to non-driven micromechanical gyroscopes and their applications still need to be addressed and solved. If there are some defective descriptions, I hope the readers of this book do not hesitate to offer their valuable advice.

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