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| | Nota di contenuto | Cover -- Title Page -- Copyright Page -- Contents -- List of Abbreviations -- Preface -- About the Authors -- Part I Fundamentals of Whole-Angle Gyroscopes -- Chapter 1 Introduction -- 1.1 Types of Coriolis Vibratory Gyroscopes -- 1.1.1 Nondegenerate Mode Gyroscopes -- 1.1.2 Degenerate Mode Gyroscopes -- 1.2 Generalized CVG Errors -- 1.2.1 Scale Factor Errors -- 1.2.2 Bias Errors -- 1.2.3 Noise Processes -- 1.2.3.1 Allan Variance -- 1.3 Overview -- Chapter 2 Dynamics -- 2.1 Introduction to Whole-Angle Gyroscopes -- 2.2 Foucault Pendulum Analogy -- 2.2.1 Damping and Q-factor 2.2.1.1 Viscous Damping -- 2.2.1.2 Anchor Losses -- 2.2.1.3 Material Losses -- 2.2.1.4 Surface Losses -- 2.2.1.5 Mode Coupling Losses -- 2.2.1.6 Additional Dissipation Mechanisms -- 2.2.2 Principal Axes of Elasticity and Damping -- 2.3 Canonical Variables -- 2.4 Effect of Structural Imperfections -- 2.5 Challenges of Whole-Angle Gyroscopes -- Chapter 3 Control Strategies -- 3.1 Quadrature and Coriolis Duality -- 3.2 Rate Gyroscope Mechanization -- 3.2.1 Open-loop Mechanization -- 3.2.1.1 Drive Mode Oscillator -- 3.2.1.2 Amplitude Gain Control -- 3.2.1.3 Phase Locked Loop/Demodulation |

| Sommario/riassunto | "Coriolis Vibratory Gyroscopes (CVGs) can be divided into two broad categories based on the gyroscope's mechanical element: (Type 1) degenerate mode gyroscopes, which have x-y symmetry, and (Type 2) non-degenerate mode gyroscopes, which are designed intentionally to be asymmetric in x and y modes. Currently, non-degenerate mode gyroscopes fulfill the needs of a variety of commercial applications, such as tilt detection, activity tracking, and gaming. However, when it comes to inertial navigation, where sensitivity and stability of the sensors are very important, commercially available MEMS sensors fall short by three orders of magnitude. Degenerate mode gyroscopes on the other hand, have a number of unique advantages compared to non-degenerate vibratory rate gyroscopes, including higher rate sensitivity, ability to implement whole-angle mechanization with mechanically unlimited dynamic range, exceptional scale factor stability, and a potential for self-calibration. For this reason, as the MEMS gyroscope development is reaching maturity, the Research and Development focus is shifting from high-volume production of low-cost non-degenerate mode gyroscopes to high performance degenerate mode gyroscopes. This paradigm shift in MEMS gyroscope research and development creates a need for a reference book to serve both as a guide and an entry point to the world of degenerate mode gyroscopes"-- |
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