

Multicopter Flight Control

Fundamentals of Flight Mechanics, Control Allocation, and Control Design

This book presents a comprehensive discussion of the mechanical modelling and control of multicopters, more commonly referred to as drones. By selecting concepts for presentation based on their ease of comprehension and suitability for practical application, the author employs a straightforward and concise approach. A main objective is to examine both the theoretical and practical aspects, as well as their interrelationship. The book presents the fundamental functional algorithms of a multicopter flight control system, specifically:

- control allocation, or the distribution of a control demand among redundant actuators;
- low-level control loops to control rotational and vertical motion;
- simple guidance loops controlling the translational motion of a multicopter; and
- an introduction to Kalman filtering, which addresses the fusion of direct sensor measurement in order to estimate the state of the drone.

These methods enable remotely piloted operation and preplanned path following.

will be of particular interest to academic researchers and graduate students working in the field of aerospace engineering, as well as to practising engineers engaged in the development of drones and electric vertical take-off and landing aircraft. It provides a comprehensive and practical guide to the fundamentals of flight control and guidance techniques, offering valuable insights for those seeking to gain a deeper understanding of these topics. In order to derive the greatest benefit from reading this monograph, readers should possess a fundamental understanding of multiple-input, multiple-output system theory, particularly state-space representation, stability and feedback control. Additionally, a basic comprehension of rotor aerodynamics and rigid-body dynamics is essential.

This book presents a comprehensive discussion of the mechanical modelling and control of multicopters, more commonly referred to as drones. By selecting concepts for presentation based on their ease of comprehension and suitability for practical application, the author employs a straightforward and concise approach. A main objective is to examine both the theoretical and practical aspects, as well as their interrelationship. The book presents the fundamental functional algorithms of a multicopter flight control system, specifically: control allocation, or the distribution of a control demand among redundant actuators; low-level control loops to control rotational and vertical motion; simple guidance loops controlling the translational motion of a multicopter; and an introduction to Kalman filtering, which addresses the fusion of direct sensor measurement in order to estimate the state of the drone. These methods enable remotely piloted operation and preplanned path following. Multicopter Flight Control will be of particular interest to academic researchers and graduate students working in the field of aerospace engineering, as well as to practising engineers engaged in the development of drones and electric vertical take-off and landing aircraft. It provides a comprehensive and practical guide to the fundamentals of flight control and guidance techniques, offering valuable insights for those seeking to gain a deeper understanding of these topics. In order to derive the greatest benefit from reading this monograph, readers should possess a fundamental understanding of multiple-input, multiple-output system theory, particularly state-space representation, stability and feedback control. Additionally, a basic comprehension of rotor aerodynamics and rigid-body dynamics is essential.



171,19 €

159,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783031784866

Medium: Buch

ISBN: 978-3-031-78486-6

Verlag: Springer

Erscheinungstermin: 04.05.2025

Sprache(n): Englisch

Auflage: Erscheinungsjahr 2025

Serie: Advances in Industrial Control

Produktform: Gebunden

Gewicht: 1045 g

Seiten: 504

Format (B x H): 160 x 241 mm

