

1. Record Nr.	UNINA9911007079203321
Autore	Johnson Wayne
Titolo	Helicopter Theory
Pubbl/distr/stampa	Newburyport, : Dover Publications, 2012
ISBN	0-486-13182-3 1-62198-653-5
Edizione	[1st ed.]
Descrizione fisica	1 online resource (1441 p.)
Collana	Dover Books on Aeronautical Engineering
Disciplina	629.133/352 629.133352
Soggetti	Helicopters Mechanical Engineering Engineering & Applied Sciences Aeronautics Engineering & Astronautics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di contenuto	Title Page; Copyright Page; Table of Contents; ACKNOWLEDGMENTS; NOTATION; Chapter 1 - INTRODUCTION; 1-1 The Helicopter; 1-2 History; 1-3 Notation; Chapter 2 - VERTICAL FLIGHT I; 2-1 Momentum Theory; 2-2 Figure of Merit; 2-3 Extended Momentum Theory; 2-4 Blade Element Theory; 2-5 Combined Blade Element and Momentum Theory; 2-6 Hover Performance; 2-7 Vortex Theory; 2-8 Literature; Chapter 3 - VERTICAL FLIGHT II; 3-1 Induced Power in Vertical Flight; 3-2 Autorotation in Vertical Descent; 3-3 Climb in Vertical Flight; 3-4 Vertical Drag; 3-5 Twin Rotor Interference in Hover; 3-6 Ground Effect Chapter 4. - FORWARD FLIGHT I4-1 Momentum Theory in Forward Flight; 4-2 Vortex Theory in Forward Flight; 4-3 Twin Rotor Interference in Forward Flight; 4-4 Ground Effect in Forward Flight; Chapter 5 - FORWARD FLIGHT II; 5-1 The Helicopter Rotor in Forward Flight; 5-2 Aerodynamics of Forward Flight; 5-3 Rotor Aerodynamic Forces; 5-4 Power in Forward Flight; 5-5 Rotor Flapping Motion; 5-6 Examples of Performance and Flapping in Forward Flight; 5-7 Review of Assumptions; 5-8 Tip Loss and Root Cutout; 5-9 Blade Weight Moment; 5-10 Linear Inflow Variation; 5-11 Higher Harmonic Flapping Motion

5-12 Profile Power and Radial Flow5-13 Flap Motion with a Hinge Spring; 5-14 Flap Hinge Offset; 5 - 15 Hingeless Rotor; 5 - 16 Gimbaled or Teetering Rotor; 5 - 17 Pitch-Flap Coupling; 5 - 18 Helicopter Force, Moment, and Power Equilibrium; 5 - 19 Lag Motion; 5 - 20 Reverse Flow; 5 - 21 Compressibility; 5 - 22 Tail Rotor; 5 - 23 Numerical Solutions; 5 - 24 Literature; Chapter 6 - PERFORMANCE; 6-1 Hover Performance; 6-2 Forward Flight Performance; 6-3 Helicopter Performance Factors; 6-4 Other Performance Problems; 6-5 Improved Performance Calculations; 6-6 Literature; Chapter 7 - DESIGN 7-1 Rotor Types7-2 Helicopter Types; 7-3 Preliminary Design; 7-4 Helicopter Speed Limitations; 7-5 Autorotational Landings after Power Failure; 7-6 Helicopter Drag; 7-7 Rotor Blade Airfoil Selection; 7-8 Rotor Blade Profile Drag; 7-9 Literature; Chapter 8 - MATHEMATICS OF ROTATING SYSTEMS; 8 - 1 Fourier Series; 8 - 2 Sum of Harmonics; 8 - 3 Harmonic Analysis; 8 - 4 Fourier Coordinate Transformation; 8 - 5 Eigenvalues and Eigenvectors of the Rotor Motion; 8 - 6 Analysis of Linear, Periodic Systems; Chapter 9 - ROTARY WING DYNAMICS I; 9 - 1 Sturm-Liouville Theory; 9 - 2 Out-of-Plane Motion 9 - 3 In-Plane Motion9 - 4 Torsional Motion; 9 - 5 Hub Reactions; 9 - 6 Shaft Motion; 9 - 7 Coupled Flap-Lag-Torsion Motion; 9 - 8 Rotor Blade Bending Modes; 9 - 9 Derivation of the Equations of Motion; Chapter 10 - ROTARY WING AERODYNAMICS I; 10-1 Lifting-Line Theory; 10-2 Two-Dimensional Unsteady Airfoil Theory; 10-3 Near Shed Wake; 10-4 Unsteady Airfoil Theory with a Time-Varying Free Stream; 10-5 Two-Dimensional Model for Rotary Wing Unsteady Aerodynamics; 10 - 6 Approximate Solutions for Rotary Wing Unsteady Aerodynamics; 10 - 7 Unsteady Airfoil Theory for the Rotary Wing 10 - 8 Vortex-Induced Velocity

Sommario/riassunto

The history of the helicopter may be traced back to the Chinese flying top (c. 400 BC) and to the work of Leonardo da Vinci, who sketched designs for a vertical flight machine utilizing a screw-type propeller. In the late 19th-century, Thomas Edison experimented with helicopter models, realizing that no such machine would be able to fly until the development of a sufficiently lightweight engine. When the internal combustion gasoline engine came on the scene around 1900, the stage was set for the real development of helicopter technology. While this text provides a concise history of helicopter
