

Contents

List of Contributors vii

About the Editors ix

About the Companion Website x

1 Sustainable Aviation: An Introduction 1

Roberto Sabatini and Alessandro Gardi

Section I Aviation Sustainability Fundamentals 29

2 Climate Impacts of Aviation 31

Yixiang Lim, Alessandro Gardi, and Roberto Sabatini

3 Noise Pollution and Other Environmental and Health Impacts of Aviation 49

Alessandro Gardi, Rohan Kapoor, Yixiang Lim, and Roberto Sabatini

Section II Systems for Sustainable Aviation 79

4 Systems Engineering Evolutions 81

Anthony Zanetti, Arun Kumar, Alessandro Gardi, and Roberto Sabatini

5 Life Cycle Assessment for Carbon Neutrality 113

Enda Crossin, Alessandro Gardi, and Roberto Sabatini

6 Air Traffic Management and Avionics Systems Evolutions 145

Alessandro Gardi, Yixiang Lim, Nichakorn Pongsakornsathien, Roberto Sabatini, and Trevor Kistan

7 Optimisation of Flight Trajectories and Airspace 165

Alessandro Gardi, Yixiang Lim, and Roberto Sabatini

Section III Aerostructures and Propulsive Technologies 213

8 Advanced Aerodynamic Configurations 215

Matthew Marino, Alessandro Gardi, Roberto Sabatini, and Yixiang Lim

9 Lightweight Structures and Advanced Materials 241

Raj Das and Joel Galos

10 Low-Emission Propulsive Technologies in Transport Aircraft 263

Kavindu Ranasinghe, Kai Guan, Alessandro Gardi, and Roberto Sabatini

11	Approved Drop-in Biofuels and Prospects for Alternative Aviation Fuels 301
	<i>Graham Dorrington</i>
	Section IV Research Case Studies 323
12	Overall Contribution of Wingtip Devices to Improving Aircraft Performance 325
	<i>Nikola Gavrilović, Boško Rašuo, Vladimir Parezanović, George Dulikravich, and Jean-Marc Moschetta</i>
13	Integration of Naturally Occurring Materials in Lightweight Aerostructures 343
	<i>Jose Silva, Alessandro Gardi, and Roberto Sabatini</i>
14	Distributed and Hybrid Propulsion: A Tailored Design Methodology 355
	<i>Martin Burston, Kavindu Ranasinghe, Alessandro Gardi, Vladimir Parezanovic, Rafic Ajaj, and Roberto Sabatini</i>
15	Integration of Hybrid-Electric Propulsion Systems in Small Unmanned Aircraft 393
	<i>Jacob Sliwinski, Alessandro Gardi, Matthew Marino, and Roberto Sabatini</i>
16	Benefits and Challenges of Liquid Hydrogen Fuels for Commercial Transport Aircraft 417
	<i>Stephen Rondinelli, Alessandro Gardi, and Roberto Sabatini</i>
17	Multi-Objective Trajectory Optimisation Algorithms for Avionics and ATM Systems 433
	<i>Alessandro Gardi, Roberto Sabatini, and Trevor Kistan</i>
18	Energy-Optimal 4D Guidance and Control for Terminal Descent Operations 457
	<i>Yixiang Lim, Alessandro Gardi, and Roberto Sabatini</i>
19	Contrail Modelling for 4D Trajectory Optimisation 475
	<i>Yixiang Lim, Alessandro Gardi, and Roberto Sabatini</i>
20	Trajectory Optimisation to Minimise the Combined Radiative Forcing Impacts of Contrails and CO₂ 499
	<i>Yixiang Lim, Alessandro Gardi, Roberto Sabatini, and Trevor Kistan</i>
21	The W Life Cycle Model – San Francisco Airport Case Study 509
	<i>Anthony Zanetti, Alessandro Gardi, and Roberto Sabatini</i>
22	Conclusions and Future Research 517
	<i>Roberto Sabatini and Alessandro Gardi</i>
	Index 523