



# An Introduction to Flapping Wing Aerodynamics (Cambridge Aerospace Series)

By Wei Shyy, Hikaru Aono, Chang-kwon Kang, Hao Liu



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This is an ideal book for graduate students and researchers interested in the aerodynamics, structural dynamics, and flight dynamics of small birds, bats, and insects, as well as of micro air vehicles (MAVs), which present some of the richest problems intersecting science and engineering. The agility and spectacular flight performance of natural flyers, thanks to their flexible, deformable wing structures as well as to outstanding wing, tail, and body coordination, is particularly significant. To design and build MAVs with performance comparable to natural flyers, it is essential that natural flyers' combined flexible structural dynamics and aerodynamics are adequately understood. The primary focus of this book is to address the recent developments in flapping wing aerodynamics. This book extends the work presented in Aerodynamics of Low Reynolds Number Flyers (Shyy et al. 2008).

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- Sales Rank: #1946478 in Books
- Published on: 2013-08-19
- Original language: English
- Number of items: 1
- Dimensions: 9.96" h x .87" w x 6.97" l, 1.80 pounds
- Binding: Hardcover
- 313 pages

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### **Editorial Review**

#### About the Author

Dr Wei Shyy is the Provost of the Hong Kong University of Science and Technology and formerly Clarence L. 'Kelly' Johnson Collegiate Professor and Department Chair of Aerospace Engineering at the University of Michigan. Shyy is the author or a co-author of four books and numerous journal and conference articles dealing with a broad range of topics related to aerial and space flight vehicles. He is General Editor of the Cambridge Aerospace Book Series (Cambridge University Press) and Co-Editor-in-Chief of the nine-volume Encyclopedia of Aerospace Engineering (2010). He has received the 2003 AIAA Pendray Aerospace Literature Award and the ASME 2005 Heat Transfer Memorial Award. He has led multi-university centers under the sponsorship of NASA, the US Air Force Research Laboratory and industry. His professional views have been quoted in various news media, including the New York Times and USA Today.

Dr Hikaru Aono is a Research Scientist at the Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency. He has made contributions to biological aerodynamics and related fluid-structure interaction issues.

Dr Chang-kwon Kang is a Postdoctoral Research Fellow at the University of Michigan. His expertise includes analytical and computational modeling of the performance of flapping wings for micro air vehicles, aeroelastic dynamics of flapping wings and other complex systems.

Dr Hao Liu is a Professor of Biomechanical Engineering in the Graduate School of Engineering at Chiba University in Japan and a Chair Professor at Shanghai Jiao Tong University in China. He is well known for his contributions to biological, flapping-flight research and biomimetics for micro air vehicles, including original publications on insect aerodynamics simulations. His professional views have been quoted in several news media, including the NHK and the Science Channel Network of the Japan Science and Technology Agency.

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