

# Understanding Aerodynamics: Arguing from the Real Physics

*By Doug McLean*

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**Understanding Aerodynamics: Arguing from the Real Physics** By Doug McLean

**Much-needed, fresh approach that brings a greater insight into the physical understanding of aerodynamics**

Based on the author's decades of industrial experience with Boeing, this book helps students and practicing engineers to gain a greater physical understanding of aerodynamics. Relying on clear physical arguments and examples, Mclean provides a much-needed, fresh approach to this sometimes contentious subject without shying away from addressing "real" aerodynamic situations as opposed to the oversimplified ones frequently used for mathematical convenience. Motivated by the belief that engineering practice is enhanced in the long run by a robust understanding of the basics as well as real cause-and-effect relationships that lie behind the theory, he provides intuitive physical interpretations and explanations, debunking commonly-held misconceptions and misinterpretations, and building upon the contrasts provided by wrong explanations to strengthen understanding of the right ones.

- Provides a refreshing view of aerodynamics that is based on the author's decades of industrial experience yet is always tied to basic fundamentals.
- Provides intuitive physical interpretations and explanations, debunking commonly-held misconceptions and misinterpretations
- Offers new insights to some familiar topics, for example, what the Biot-Savart law really means and why it causes so much confusion, what "Reynolds number" and "incompressible flow" really mean, and a real physical explanation for how an airfoil produces lift.
- Addresses "real" aerodynamic situations as opposed to the oversimplified ones frequently used for mathematical convenience, and omits mathematical details whenever the physical understanding can be conveyed without them.

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**Understanding Aerodynamics: Arguing from the Real Physics** By Doug McLean Bibliography

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## **Editorial Review**

### Review

“As someone who has been involved with aerodynamics for more years than I care to remember, I have rarely come across a book that is so readable and that provides so many (to me a least) genuinely new insights into the subject and its applications. This book should be high on the wish list of any practising aerodynamicist, whether in industry or academia.” (*Aeronautical Journal*, 1 August 2013)

“This is a sophisticated book for people immersed in the study of fluid dynamics and aerodynamics; it will give them in-depth knowledge of both the physical phenomena and the mathematical equations that are used to describe and predict these phenomena. Summing Up: Recommended. Graduate students in aerospace engineering, researchers/faculty, and aircraft design professionals.” (*Choice*, 1 July 2013)

“Based on the author’s decades of industrial experience with Boeing, this book helps students and practicing engineers to gain a greater physical understanding of aerodynamics. Relying on clear physical arguments and examples, Mclean provides a much-needed, fresh approach to this sometimes contentious subject without shying away from addressing "real" aerodynamic situations as opposed to the oversimplified ones frequently used for mathematical convenience.” (*Expofairs.com*, 11 March 2013)

### From the Back Cover

A real understanding of aerodynamics must go beyond mastering the mathematical formalism of the theories and come to grips with the physical cause-and-effect relationships that the theories represent. In addition to the math, which applies most directly at the local level, intuitive physical interpretations and explanations are required if we are to understand what happens at the flowfield level. This book aims to promote such physical understanding.

*Understanding Aerodynamics: Arguing from the Real Physics* provides a more thorough review of the physical underpinnings of fluid mechanics than is typical of conventional aerodynamics books, and it covers topics specific to aerodynamics with greater physical rigor. Many of the discussions and explanations in the book are novel in the sense that they attempt to remedy incompleteness or inconsistencies in previously available sources. Examples include the discussion of how aerodynamics fits in with modern physical theory in general, the explanations and discussions of the "induction" fallacy, the effect of surface roughness on turbulent skin friction, the basic mechanism for the lift on an airfoil, and the global pressure and momentum-flux balances in the flowfield around a lifting 3D wing.

This book provides:

- An understanding of what the equations and theories of aerodynamics really mean
- Real physical explanations for aerodynamic phenomena such as lift
- Discussions of important topics that are often missing in other aerodynamics books, such as three-dimensional flow in boundary layers
- A broad view of the field and how it all fits together

*Understanding Aerodynamics: Arguing from the Real Physics* meticulously captures the results of the

author's decades of pondering, discussing, and arguing the physical aspects of aerodynamic flows and is sure to help practicing engineers, as well as students, to gain a greater physical understanding of aerodynamics.

## **Users Review**

### **From reader reviews:**

#### **Robert Clift:**

Information is provisions for folks to get better life, information today can get by anyone from everywhere. The information can be a knowledge or any news even restricted. What people must be consider when those information which is from the former life are challenging to be find than now could be taking seriously which one is suitable to believe or which one the particular resource are convinced. If you obtain the unstable resource then you get it as your main information it will have huge disadvantage for you. All those possibilities will not happen with you if you take Understanding Aerodynamics: Arguing from the Real Physics as the daily resource information.

#### **William Watts:**

The guide with title Understanding Aerodynamics: Arguing from the Real Physics possesses a lot of information that you can discover it. You can get a lot of benefit after read this book. This book exist new expertise the information that exist in this book represented the condition of the world right now. That is important to yo7u to know how the improvement of the world. This book will bring you with new era of the syndication. You can read the e-book in your smart phone, so you can read that anywhere you want.

#### **Ruth Lynch:**

This Understanding Aerodynamics: Arguing from the Real Physics is great e-book for you because the content which can be full of information for you who all always deal with world and also have to make decision every minute. This specific book reveal it info accurately using great coordinate word or we can state no rambling sentences within it. So if you are read the item hurriedly you can have whole data in it. Doesn't mean it only provides straight forward sentences but challenging core information with attractive delivering sentences. Having Understanding Aerodynamics: Arguing from the Real Physics in your hand like getting the world in your arm, information in it is not ridiculous one particular. We can say that no e-book that offer you world within ten or fifteen tiny right but this e-book already do that. So , this is good reading book. Hey Mr. and Mrs. busy do you still doubt that will?

#### **Justin Pritchett:**

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in looking at a book.

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