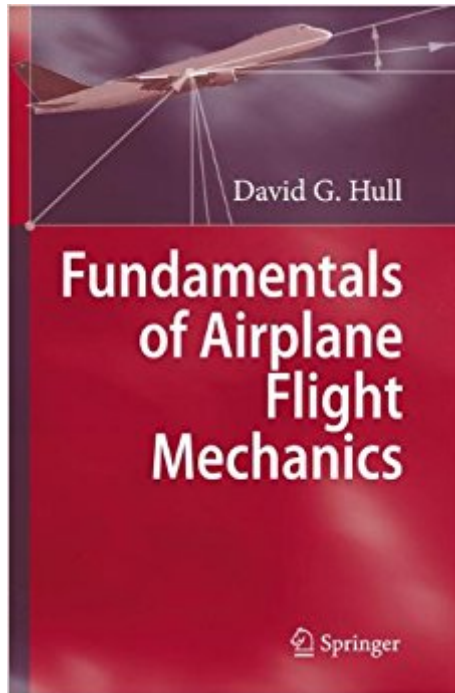




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# Fundamentals Of Airplane Flight Mechanics



## Synopsis

Flight mechanics is the application of Newton's laws to the study of vehicle trajectories (performance), stability, and aerodynamic control. This volume details the derivation of analytical solutions of airplane flight mechanics problems associated with flight in a vertical plane. It covers trajectory analysis, stability, and control. In addition, the volume presents algorithms for calculating lift, drag, pitching moment, and stability derivatives. Throughout, a subsonic business jet is used as an example for the calculations presented in the book.

## Book Information

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## Customer Reviews

From the reviews: "The text under review addresses performance, stability, and control (static and dynamic) characteristics of aircraft from the viewpoint, according to the author, of a one semester, junior-level course on these topics. It is readable, at an appropriate level for undergraduates. It is also a good choice to help a more experienced person to come up to speed on basic flight mechanics. I certainly recommend it for these situations." (Keith Koenig, SIAM Review, Vol. 49 (4), 2007) "There are two basic problems in airplane mechanics: (1) given an airplane, what are its performance, stability and control characteristics? and (2) given performance, stability and control characteristics, what is the airplane? The book is concerned with the first problem, but its organization is motivated by the structure of the second problem. The book is not only a very good educational tool, but also a competent research exposition monograph, and

it is recommended to students and researchers in flight mechanics." (Adrian Carabineanu, Zentralblatt MATH, Vol. 1126 (3), 2008)

Airplane flight mechanics is the application of Newton's laws to the study of airplane trajectories (performance), stability, and aerodynamic control. This text is limited to flight in a vertical plane and is divided into two parts. The first part, trajectory analysis, is concerned primarily with the derivation of analytical solutions of trajectory problems associated with the sizing of commercial jets, that is, take-off, climb, cruise, descent, and landing, including trajectory optimization. The second part, stability and control, is further classified as static or dynamic. On each iteration of airplane sizing, the center of gravity is placed so that the airplane is statically stable. Dynamic stability and control is included to study the response of an airplane to control and gust inputs, which is needed for the design of automatic flight control systems. Algorithms are presented for estimating lift, drag, pitching moment, and stability derivatives. Flight mechanics is a discipline. As such, it has equations of motion, acceptable approximations, and solution techniques for the approximate equations of motion. Once an analytical solution has been obtained, numbers are calculated in order to compare the answer with the assumptions used to derive it and to acquaint students with the sizes of the numbers. A subsonic business jet is used for these calculations.

Really, that's all I have to say; this book is horrible. I hope no one ever has to suffer the fate of having to use this book. Quite frankly, I'd be leery of any professor that would insist on using such a book. Or any department that would hire the sort of professor that would use this book. It's all based on a mysterious small business jet. Is full of typos and errors, and is quick to neglect terms in the math for the sake of simplicity.

As a student in the class taught by the "genius" who wrote this book (nearly 30 years ago no less), I can say firsthand how utterly useless the book is. The entire thing is spent deriving equations that are at best reasonable approximations (that can't really be applied with any precision to real engineering problems) - not to mention how spotty and horrible the derivations are, since it skips tons of steps and expects you to understand concepts never mentioned prior - and worst of all, all the derivations are super specific to this hypothetical "small business jet" that doesn't actually exist. Yes yes, learning the derivations of these approximation helps you "understand" the concepts at work, but this book is just horrible at even doing that. Don't buy it for fun, and if you have to buy it for class (primarily Flight Dynamics at UT Austin - where the professor teaches), do your best to borrow

someone else's copy and save your own money for more productive things.

I've learned more about flight dynamics from watching birds take mid-flight poos on my car.

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