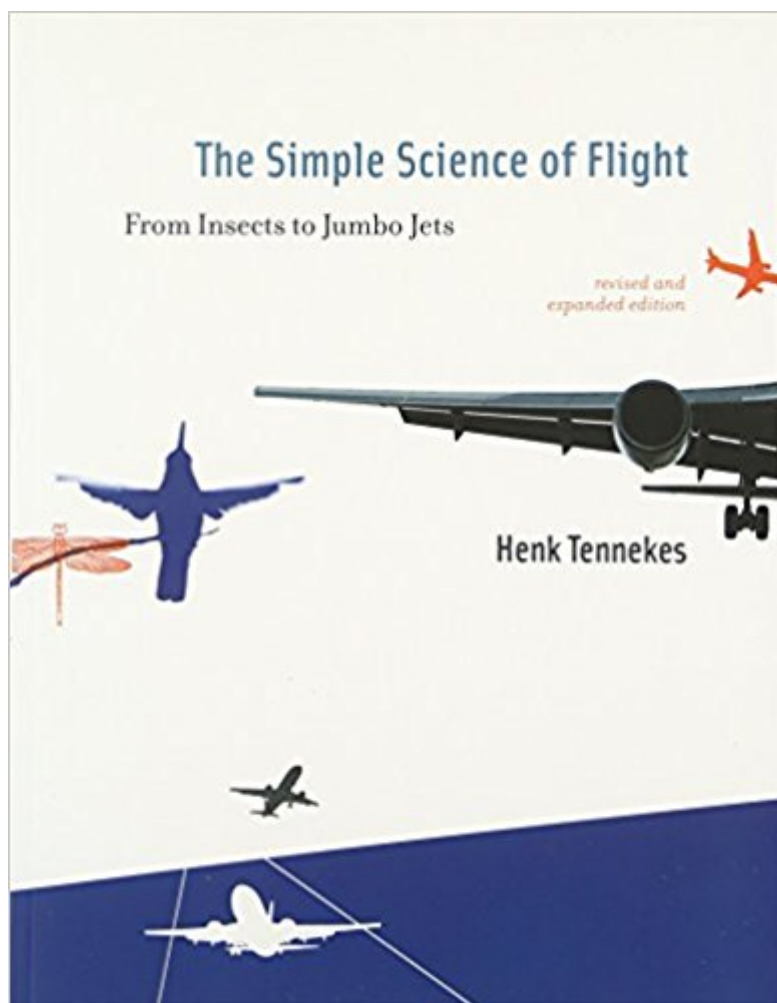


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The Simple Science Of Flight: From Insects To Jumbo Jets (MIT Press)



Synopsis

From the smallest gnat to the largest aircraft, all things that fly obey the same aerodynamic principles. In *The Simple Science of Flight*, Henk Tennekes investigates just how machines and creatures fly: what size wings they need, how much energy is required for their journeys, how they cross deserts and oceans, how they take off, climb, and soar. Fascinated by the similarities between nature and technology, Tennekes offers an introduction to flight that teaches by association. Swans and Boeings differ in numerous ways, but they follow the same aerodynamic principles. Biological evolution and its technical counterpart exhibit exciting parallels. What makes some airplanes successful and others misfits? Why does the Boeing 747 endure but the Concorde now seem a fluke? Tennekes explains the science of flight through comparisons, examples, equations, and anecdotes. The new edition of this popular book has been thoroughly revised and much expanded. Highlights of the new material include a description of the incredible performance of bar-tailed godwits (7,000 miles nonstop from Alaska to New Zealand), an analysis of the convergence of modern jetliners (from both Boeing and Airbus), a discussion of the metabolization of energy featuring Lance Armstrong, a novel treatment of the aerodynamics of drag and trailing vortices, and an emphasis throughout on evolution, in nature and in engineering. Tennekes draws on new evidence on bird migration, new wind-tunnel studies, and data on new airliners. And his analysis of the relative efficiency of planes, trains, and automobiles is newly relevant. (On a cost-per-seat scale, a 747 is more efficient than a passenger car.)

Book Information

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Customer Reviews

"This was a great little book when it came out in its original edition; this new version is even better, as it contains both Henk's homage to his favorite flying machine (Boeing 747) and explanations based on some of the unexpected results of recent experiments with bird flight (including a phenomenal gliding jackdaw). Read it, then watch the birds and planes, and then dip into it again and again."--Vaclav Smil, University of Manitoba, and author of "Global Catastrophes and Trends"
"One gets a fine sense of how so much of aircraft design--whether by humans or by evolution--depends on size and mission. This new version of "The Simple Science of Flight" broadens the enlightenment that so many of us found appealing in its predecessor. It yields even more of that satisfying 'now I understand what's happening' rather than the usual 'how brilliant those designers must be.' And I know of no book that derives such an awesome wealth of insight from such simple quantification. Beyond being informative, it provides pleasant reading--for any one who travels by air, watches animals fly, or dreams of learning to fly."--Steven Vogel, James B. Duke Professor, Emeritus, Duke University

Henk Tennekes is Director of Research Emeritus at the Royal Netherlands Meteorological Institute, Emeritus Professor of Meteorology at Free University, Amsterdam, and Emeritus Professor of Aerospace Engineering at Pennsylvania State University. He is the coauthor of *A First Course in Turbulence* (MIT Press, 1972).

Agreeable and often gripping reading, this book has popular scientific purposes, keeping strictly scientific in language and showing method: at the start the physical quantities used are defined, then these quantities are put in diagrams to show the relations between them and the author makes these diagrams very telling. The writing is in general flowing and the communication is forceful but in at least one case it gives rise to some perplexity: ". . . creating a region of reduced pressure on the top surface (a kind of suction), which pulls the passing air downward." (pg. 5). In the same paragraph Tennekes rails against the "polite fiction and misapprehension" told by high school teachers to explain the generation of lift. (I am pushed to ask where teachers learn these things?) The range of arguments touched is very wide: dimensions of wings from insects to big airplanes; long distance migration of several kinds of birds; comparative analysis of energy consumption between birds,

cars, trains and jets . . . all explained through the laws of flight introduced in the first chapter. A brief amusing and instructive paragraph is devoted to the stability of a paper airplane. The amount of figures is very useful for the comprehension and the figures of birds are lovely. The public target of this book is very wide, and actually the book could be read by everyone, but with some rudiment of physics or with a more deep reading of diagrams you will have more benefit. Sandro Girolamo Tropiano, member of "Naturalmentescienza.it" editorial staff.

Henk Tennekes writes a concise and accurate introduction to the physics of flight. This edition has more typographical errors than I expected (some words that were spelled correctly in the first edition are misspelled here) but the additional material he added is most welcome. If it weren't for the typos and the slightly lower quality of the paper and binding of the book, I would rate it five stars, as I do and did the first edition.

An excellent overview of the how and why that flight is possible - from humming birds to 747s. And with some graphs and instructive analytics to give a sense of the proportion of things.

Many books on aerodynamics cover the standard range of speed, weights etc. Prof. Tennekes extends the range to the limits of the envelope, and provides data for a wide range of birds, insects and extends the equations of flight to ultralights and the human powered Gossamer Condor

This brief, handsome, book explains a few of the basic mathematical principles governing speed and efficiency of flight. You don't need anything more advanced than high school algebra to comprehend the material but you, like me, may have to work a little bit if you haven't used math in a while. The author focuses on birds and jets but mentions insects, human powered aircraft, gliders, kites, and even pteranodon's. I found the treatment of the force triangle obscure (the skating analogy didn't help). I also wish the author had developed more topics (for example, I was left wondering why an angle of attack of 6 degrees is common).

Haven't read it through but it is really good so far. The author keeps referring to real birds in order to compare to modern jetliners and other man made craft. It corrects misconceptions on the nature of flight with actual equations that do make sense and boils everything down to how things do work in terms of actual power, force, speed, energy. A real gem.

There is detailed knowledge in this book, of necessity that means formulae and definitions of force , power, energy etc but if you want an accessible way of leaning about the nature of birds and aircraft and the physics that make them so different and so similar this is a short and excellent volume to start.

Loved it.It was EVERYTHING it was advertised to be.

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