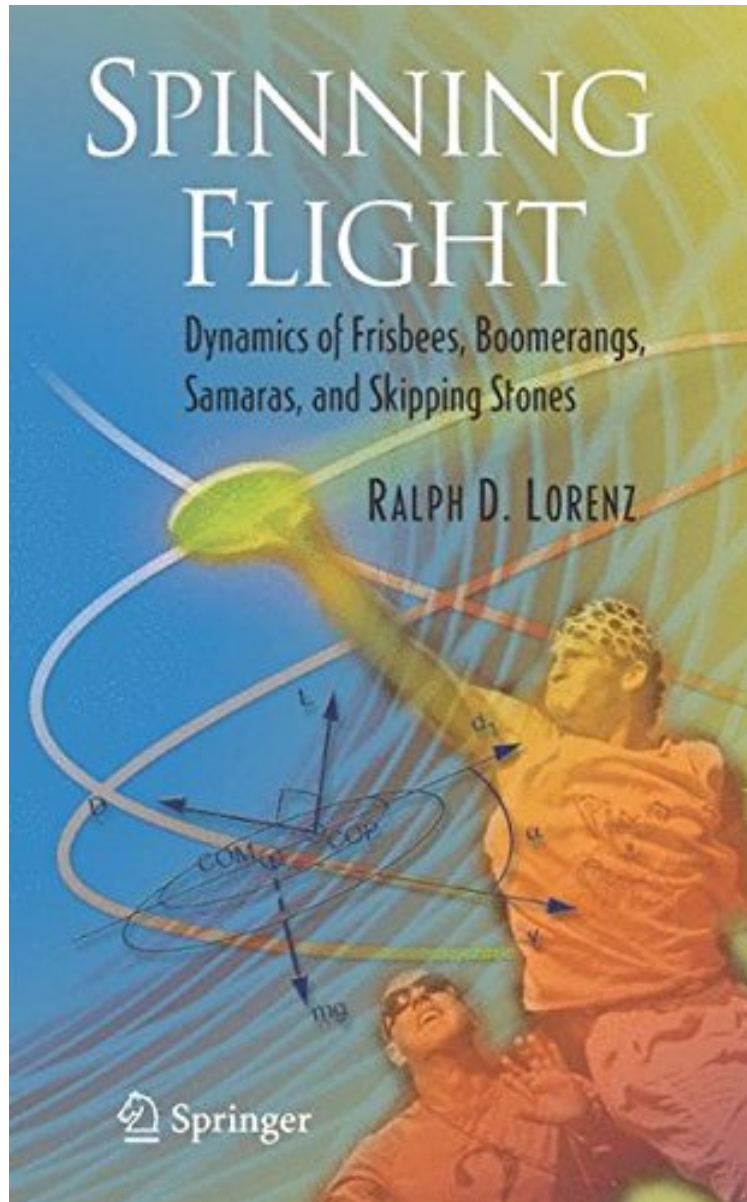


[Free download] Spinning Flight: Dynamics of Frisbees, Boomerangs, Samaras, and Skipping Stones

Spinning Flight: Dynamics of Frisbees, Boomerangs, Samaras, and Skipping Stones

Ralph D. Lorenz

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Ralph D. Lorenz : Spinning Flight: Dynamics of Frisbees, Boomerangs, Samaras, and Skipping Stones before purchasing it in order to gage whether or not it would be worth my time, and all praised Spinning Flight: Dynamics of Frisbees, Boomerangs, Samaras, and Skipping Stones:

2 of 2 people found the following review helpful. From theory to practice to experimentation: A great way to learn! By David S. Mazel *Spinning Flight* by Ralph D. Lorenz is a fine addition to anyone's science library. While the book has a few shortcomings, overall it is a terrific discussion of spinning objects with a good balance of science and examples. If you read no further, then buy the book and enjoy it. You won't regret it. The text is a good exposition of the dynamics of flight for a potpourri of objects from balls, bullets, bombs, rockets, satellites, and Frisbees; to spinning parachutes, aircraft, boomerangs, skipping stones and bouncing bombs. Mr. Lorenz provides a short introduction into the mathematics needed to understand and then goes through examples. Lots of examples, applications, and popular activities to see where this work applies. With each example, he gives you the object, how it behaves, why it behaves as it does, and he even gives graphs that describe these behaviors. The author often tells a story about the objects and how they evolved to objects we use today. The stories bring the science to life--if you don't like the science, you'll still like the stories. For example, tennis balls. Originally tennis balls were hand stitched so no two flew exactly alike. Now, they are machine made and have a rubber core. The original balls were white, now they are yellow and come in many other colors for better visibility. Because the balls fly at a speed above the critical Reynolds number (see the book for what this is, or do a web search!) the "boundary layer is tripped into turbulence with a spin-dependent location." What does that mean? It means that when you add top spin, the ball will dive downward so a fast shot will still be in-bounds. Current tennis balls have a low drag, making for a fast tennis game. But, Mr. Lorenz tells us, the International Tennis Federation may introduce a larger ball; that would increase the drag and lead to a slower game. This is the basic (but not exhaustive) method of how the text flows. The object is introduced, details of its flight are given, and then some expository text and a story to boot. Let me cite another example: did you know that if you put spin on a super ball, you can reverse its bounce? If the super ball is spinning backward, then because of its contact friction it can bounce at a backward direction instead of bouncing forward as it would without spin. One area that's captivating is the spin on bullets, bombs, and rockets. The book gives you a good historical story of the various experiments performed to perfect this idea and it also gives you wonderful pictures of test shots. The book touches on spinning asteroids and how radar can be used to measure the spin period. (I was disappointed that more technical details were not here, but the ideas were still good to know.) Frisbees are flying objects that most of us know. Naturally, the book discusses them and the treatment is well-done and detailed. It won't make you a better player, but it will make you marvel at how much science is in that platter of plastic. The boomerang is touched upon, too, and with some historical details. For example, there are a variety of boomerangs depending on one's purpose. Some are used to fly over birds, scaring them to flight and then to capture. Some are heavy, meant for hunting and are intended to strike and thereby stun an animal. The book provides an interesting antidote of a boomerang throw that would be infinite. That is, if there were no ground to intercept the flight, how would the flight path look. It's mostly of theoretical interest but fascinating nonetheless. I would fault the book for the following, however,. The pictures are okay, but the quality of the photos and graphs is a bit low. Some of the graphs are hard to read. The reader can still understand the plots, but he has to work at it. The color pictures in the middle of the book would do better had they been placed within the text. That may be something the publisher does for costs but they would have livened-up the material if they appeared with the text. The author shies away from some mathematics and generally presents his work with few equations. I don't know if that's because there simply aren't equations to describe the behavior (maybe we can only describe the motion through experimentation and plots) but I think there were plenty of opportunities for more in-depth mathematics than the author gave. To end on a positive note, Mr. Lorenz gives something that others often do not. And it's a bonus worth having. At the end, he gives you a guide, complete with a schematic diagram (parts list, really) and program so that you, the reader, can instrument an object and collect flight data. Thus, the book goes from theory, to practice, to experimentation. All in all, a great way to learn. P.S. There's a part about bouncing bombs to avoid torpedo nets. What a cool application of spinning objects! 4 of 4 people found the following review helpful. Be sure what you want to get By Murat Ozveri The reason I bought the book was learning more about boomerangs -more precisely hunting boomerangs- and arrow flight. The very beginning of the book is quite complicated, perhaps due to the professional identity of the author, but is understandable if you have good basics in Physics. All the issues seemed to have been seen and explained from the perspective of an engineer and there is not too much for individuals who look for some practical info. There is almost nothing about straight flying boomerangs (while the returners were well-explained) and literally nothing about arrow flight, which is also acceptable because of the very complex physical character of it. Besides, I found the book well-written by a very knowledgeable author. With its hardcover and hi-quality paper and print it would be worth to have it in your library as a reference book about spinning flight. If you know what you would like to get from the book it will be useful. 9 of 9 people found the following review helpful. Favorable Review By Ralph Lorenz (I am the author - I think the book is not half bad - but let me quote from a recent review of the book by H. K. Moffatt {whom I do not know} in *Nature* magazine (Vol.444, 14 Dec 2006 p.820): 'In his fascinating book *Spinning Flight*, Ralph Lorenz provides a rich feast of examples of such spinning bodies, some occurring naturally, some contrived for pleasure or for a practical purpose, some exotic..... Lorenz covers these phenomena and their various manifestations with great skill and economy of exposition, whetting the appetite for the more detailed treatments that he cites in an extensive list of references, many quite recent... The book is well organized.... there may

be something for every one within its attractively designed cover

More frisbees are sold each year than baseballs, basketballs and footballs combined. Yet these familiar flying objects have subtle and clever aerodynamic and gyrodynamic properties which are only recently being documented by wind tunnel and other studies. In common with other rotating bodies discussed in this readily accessible book, they are typically not treated in textbooks of aeronautics and the literature is scattered in a variety of places. This book develops the theme of disc-wings and spinning aerospace vehicles in parallel. Since many of the examples are recreational, anyone who enjoys these activities will likely find it profitable and enjoyable. In addition to spinning objects of various shapes, several exotic manned aircraft with disc planforms have been proposed and prototypes built these include a Nazi secret weapon and the De Havilland Avrocar, also discussed in the book. Boomerangs represent another category of spinning aerodynamic body whose behavior can only be understood by coupling aerodynamics with gyrodynamics. The narrative, supported by equations and graphs, explains how the shape and throw of a boomerang relates to its trajectory. The natural world presents still other examples, namely the samaras or seed-wings of many tree species, which autorotate during their descent, like a helicopter whose engine has failed. The flight performance of these spinning wings directly affects the dispersal and thus the evolutionary competitiveness of the trees concerned. Samara-type configurations are also considered for instrumentation and other payload dispersal applications. In short, the book discusses a range of familiar, connected, but largely undeveloped, topics in an accessible, but complete, manner. From the reviews of the first edition: "In his fascinating book *Spinning Flight*, Ralph Lorenz provides a rich feast of examples of spinning bodies . The book is well organized . The discussion in the book should be accessible to readers with some elementary understanding of aerodynamic principles. For the expert, the book is full of open problems . Its scope is extensive . In this respect, there may be something for everyone within its attractively designed cover ." (H. K. Moffatt, *Nature*, Vol. 444, December, 2006) "If you liked physics at school, then this book is for you. It concerns itself with flying objects that spin through the air, and even tells you how to impress your friends with the biomechanics of Frisbees. there is plenty of information at all levels, and the book has a wealth of detail that only an aerospace engineer like Lorenz could have come up with." (Len Fisher, *BBC Focus*, February, 2007)

From the reviews: "In his fascinating book *Spinning Flight*, Ralph Lorenz provides a rich feast of examples of spinning bodies . The book is well organized . The discussion in the book should be accessible to readers with some elementary understanding of aerodynamic principles. For the expert, the book is full of open problems . Its scope is extensive . In this respect, there may be something for everyone within its attractively designed cover ." (H. K. Moffatt, *Nature*, Vol. 444, December, 2006) "If you liked physics at school, then this book is for you. It concerns itself with flying objects that spin through the air, and even tells you how to impress your friends with the biomechanics of Frisbees. there is plenty of information at all levels, and the book has a wealth of detail that only an aerospace engineer like Lorenz could have come up with." (Len Fisher, *BBC Focus*, February, 2007) "To my knowledge, Lorenz's work is the first in which the dynamics of spinning bodies have been treated under a single cover. Lorenz's book is written for the general reader who has a basic science education and is eager to learn about physics, even the most esoteric of subjects. When you want sometime off from the intense working environment of the modern technical world, sit down and read *Spinning Flight* and enjoy the ride." (John D. Anderson Jr, *Physics Today*, December 2007) From the Back Cover More frisbees are sold each year than baseballs, basketballs, and footballs combined. Yet these familiar flying objects have subtle and clever aerodynamic and gyrodynamic properties which are only recently being documented by wind tunnel and other studies. In common with other rotating bodies discussed in this readily accessible book, they are typically not treated in textbooks of aeronautics and the literature is scattered in a variety of places. This book develops the theme of disc-wings and spinning aerospace vehicles in parallel. Many readers will have enjoyed these vehicles and their dynamics in recreational settings, so this book will be of wide interest. In addition to spinning objects of various shapes, several exotic manned aircraft with disc platforms have been proposed and prototypes built - these include a Nazi secret weapon and the De Havilland Avrocar, also discussed in the book. Boomerangs represent another category of spinning aerodynamic body whose behavior can only be understood by coupling aerodynamics with gyrodynamics. The narrative, supported by equations and graphs, explains how the shape and throw of a boomerang relates to its trajectory. The natural world presents still other examples, namely the samaras or seed-wings of many tree species, which autorotate during their descent, like a helicopter whose engine has failed. In short, this book discusses a range of familiar, connected, but largely undeveloped, topics in an accessible, but complete manner. Toys familiar to all of us are covered as well as high-tech products of the aerospace industry. *Spinning Flight* includes not only the latest published results but also describes Lorenz's own experiments with how-to instructions on how readers can do their own experiments.