Preface

The number of baseball and softball fans in the world is probably around 100 million. The number of people who are interested in physics might also be about 100 million. In theory, therefore, this book should appeal to somewhere between 100 million and 200 million people. However, the number of people who are seriously interested in both physics and baseball or softball is somewhat less than this. Only a handful of physicists in the world have actually conducted serious studies of the physics of baseball and softball. Not because the subject does not interest them, but because they are usually too busy doing other serious physics work. If they were caught out doing fun baseball experiments on the side, it might give the false impression that they were not being properly employed. Partly because of the nature of the subject, there have been many more engineers and biomechanists and even historians and economists who have engaged in academic studies of baseball and softball.

While baseball is known as the national pastime in the USA and softball is even more popular in terms of the total number of players, sport is not a high priority area when it comes to government or even private funding of physics research. Nevertheless, physics laboratories are usually sufficiently well equipped for anyone who is so inclined to sneak in some sports research on the side. That is how I first managed to get involved, in 1995. I found it absolutely fascinating and I still do. Part of the fascination is in discovering things that were not previously known. The physics of sport is not a rich field for "new" physics, but it is fun using "old" physics to provide new insights into some of nature's mysteries. The bounce of a ball is just one of those mysteries. Very little was known about the subject when I started in 1995, apart from some early work done by Sir Isaac Newton around 1670 and a few additional studies during the next 300 years. Much more was known about the flight of balls through the air. My background before getting sidetracked into the physics of sport was 30 years experience in high temperature plasma physics research. It had no particular relevance to baseball or softball, apart from the fact that it helps to teach and study physics for 30 years or more to get on top of the subject.

In 1990, Professor Robert Adair at Yale University wrote a very popular book called "The physics of baseball." It is currently in its third edition and provides an easy-to-read and entertaining account of the subject. During the last 15 years there have been many advances in our understanding of the physics and engineering of baseball and softball, and there is now room for a second book on the subject. Given that baseball and softball are both very similar sports, the physics of one is essentially the same as the physics of the other. In fact, the physics of sport is essentially the same as the physics of many other topics and likely to be a lot more interesting to anyone with an active interest in sport. Basic mechanics features prominently in this book, almost all of the examples being taken from baseball and softball. I would have achieved a useful objective if some of the material finds its way into classrooms.

The wide range of interests and abilities of the 100 million baseball and softball fans in the world presented me with a problem. Even if I assumed that only 10 million of those fans were interested in physics, only a tiny fraction of that number would have studied physics at University level. I have, therefore, written the book assuming that most readers will have a basic understanding of high school physics, but are not necessarily proficient at that level. One of my objectives is to try to boost that proficiency by emphasizing the physics issues in baseball and softball in more detail than in Adair's book. Professor Adair achieved an excellent result in explaining baseball in terms of the known laws of physics. A difference between his book and mine is that I have placed greater emphasis on explaining the physics in terms of the known behavior of bats and balls. I have tried to discuss the physics in a conversational manner, using simple equations where necessary, but I have also included more advanced material in the Appendices at the end of each chapter. That way, the reader can skip the hard parts or can refer to them later, depending on his or her prior knowledge of, and interest in, physics and mathematics.

I am especially grateful to Professor Alan Nathan at the University of Illinois for his assistance in helping me prepare this book. Alan and I have collaborated on many physics of sports projects over the years, despite living 9,240 miles apart. Both of us maintain web sites that contain additional material on the physics of baseball and softball, including some interesting video film of various topics described in this book. The sites are www.physics.usyd.edu.au/~cross and http://go.illinois.edu/physicsofbaseball. Professor Lloyd Smith also provided valuable assistance, especially on the physics of softball, and has a very nice site at www.mme.wsu.edu/~ssl, as does Professor Dan Russell at http://paws.kettering.edu/~drussell/bats.html. A web search on "physics of baseball" will reveal thousands of other sites, indicating that there are indeed many thousands of people actively interested in the topic.

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