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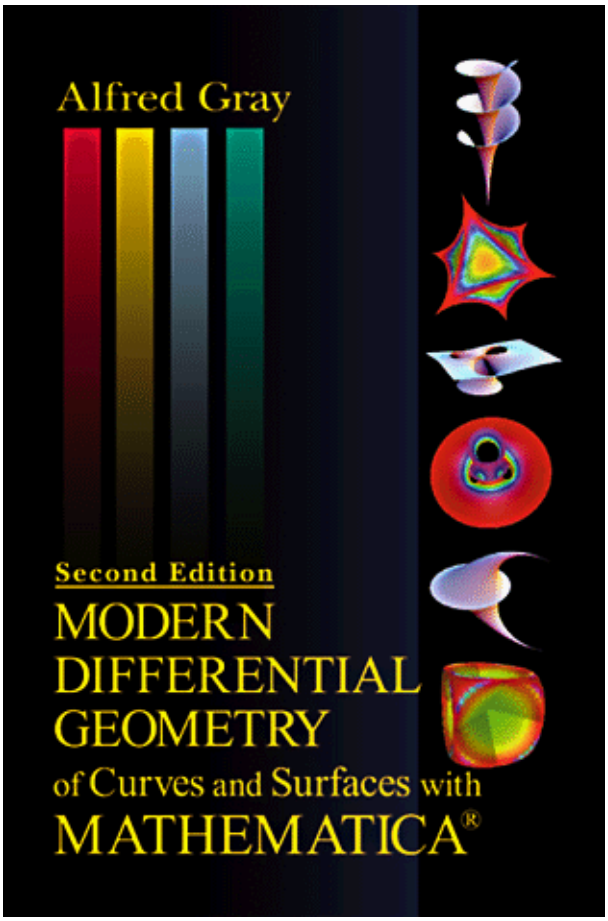

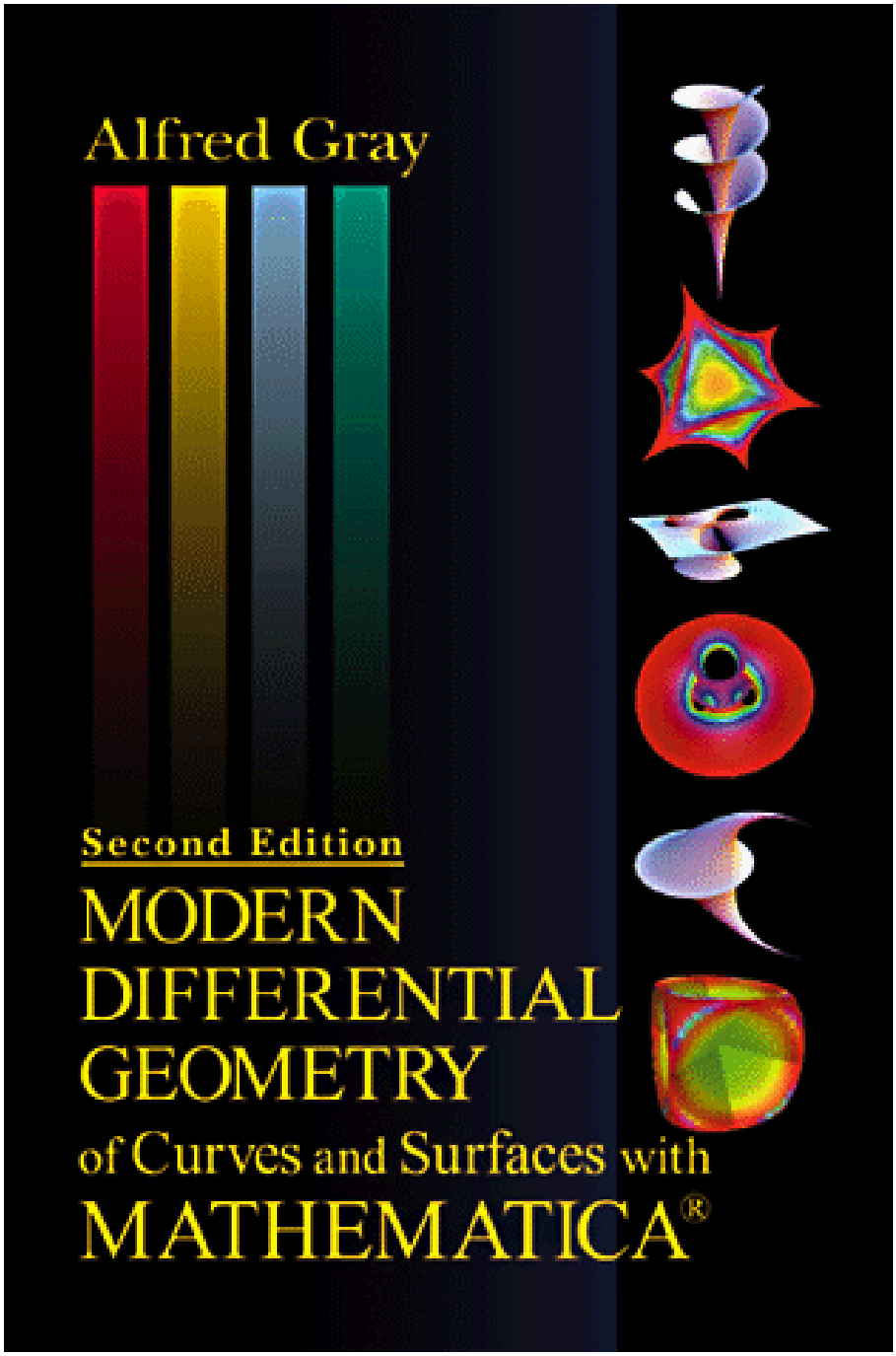

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"I wish that I would have used this book as my introduction to differential geometry instead of the here-unnamed horror-flick-of-a-book required by my early professors on the subjectIn the high-turnover of textbooks this much improved 2nd edition is truly deserving of the title and furthermore acts as an excellent tribute to its author." - The Mathematica Journal, Vol. 7 No. 2, 1998 "More than any other text I am aware of, Gray integrates computing into the materialGray's Mathematica programs offer new and fascinating ways to present material. With an appropriate selection of material the first edition and, even better, the present second edition, may provide an excellent background for a course on the subjectsecond edition provides considerable extensions of the subjectsauthor's acknowledgements show that comments from a lot of well-known geometers have lead to an improvement of the book." --Bernd Wegner, Zentralblatt MATH, Vol. 942

About the Author

Gray; Alfred University of Maryland, College Park, USA,

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18 of 18 people found the following review helpful.
Good introduction to differential geometry
By Dr. Lee D. Carlson
The visualization of complicated geometrical objects is now routine thanks to the excellent software that has been developed over the past two decades. Now students and professionals can have a better appreciation of the geometrical properties of these objects thanks to these software packages. In this book the author has done a great job of doing this, having chosen one of the best tools for this purpose: Mathematica. The book is a hefty one, totaling almost 1100 pages, but its perusal is worth the effort for those who want a more intuitive appreciation behind the concepts of differential geometry. Physicists in particular, who usually need a pictorial approach to complement the learning of a subject, should really enjoy this book. It could definitely be used as a textbook in a beginning course in differential geometry since there are problems at the end of each chapter and most of the results in the book are proven with the required mathematical rigor, I.e. this book is not just code and pictures, and a substantial portion of it is devoted to definitions and rigorous proofs. This is especially true for the discussion on differentiable manifolds and Riemannian geometry. The author also includes a brief biography of the mathematicians who have been involved in differential geometry at various places in the book. The Mathematica code in the book though can be revised to make it look more like standard mathematical notation, thanks to the new features of Mathematica that have appeared since this book was published (1997). The use of color shading is not done in the book, except for a short insert with pictures of several surfaces, but the reader can easily experiment with the color functions available in Mathematica if needed. A very lengthy appendix that lists the functions and code used in the book is included.
Some of the concepts that are usually

difficult to grasp intuitively for those approaching differential geometry for the first time but are here illustrated nicely include: 1. The computation of the curvature of plane curves and the plotting of this curvature. The curvature of the famous Lissajous curves, very familiar from oscilloscope traces, is computed. The author might have spent a little more time explaining why the curvature plots have the shape they do however. 2. The treatment of osculating curves to plane curves. 3. The finding of curves whose curvature is equal to the arc length times a Bessel function. The resulting plots are very entertaining. 4. The computation of the torsion of a curve in space. The discussion on torus knots is particularly well-done. 5. The author's discussion on surfaces in Euclidean space motivates well the concept of a differentiable manifold. He plots a few surfaces with coordinate patches that have a singularity, and shows how to plot surfaces that defined nonparametrically. Kummer's surface, of particular importance in algebraic geometry, is plotted here. Even more useful is the author's treatment of nonorientable surfaces, wherein he shows the reader how to plot the Moebius strip, the Klein bottle, and two realizations of the projective plane using Mathematica. Several examples of the Gaussian curvature of surfaces are plotted. The Gauss map, one of the most important tools for the physicist, is given detailed treatment. 6. Rare in textbooks at this level of differential geometry is a discussion of minimal surfaces, but the author gives a very nice treatment in this book. The Enneper's, Scherk's Henneberg's and Catalan's minimal surfaces are plotted along with the Gauss map of Enneper's surface. Minimal surfaces are extremely important in theoretical physics, such as superstring and membrane theories, and are also very important in optimization theory, so it was nice to see a discussion of them included in the book. In recent years galleries of minimal surfaces have appeared on the Web, and this book allows one to plot these without too much effort. The author even introduces the use of complex analysis in the study of minimal surfaces. Readers interested in understanding the mathematics of string theory will appreciate this discussion. In addition, the Weierstrass representation, which allows generation of new minimal surfaces, is introduced. Readers familiar with the Weierstrass function for elliptic curves will see it used here for this generation.

19 of 22 people found the following review helpful.
Title is Misleading
By A Customer
Using this book might help you learn Mathematica, but if your goal is to learn differential geometry, please try something else. The Mathematica learner can benefit from the numerous useful examples and exercises in the book. In most programming books, the examples provided are trivial and usually do nothing useful, and this can make reading the book extremely boring. By using "Modern Differential Geometry of Curves and Surfaces with Mathematica"as a companion to a standard book on Mathematica, you can find a way out of this boredom. But the book essentially lacks the qualities of a text on pure mathematics. In some cases it lacks mathematical rigor, and even sometimes the definitions and their usage are inconsistent (see pages 159-161 for instance.) The proofs are also usually nothing but simple manipulations of formulae, the type that we have encountered mostly in high school. And when complicated mathematical reasoning becomes necessary, the author simply tries to avoid it. To summarize, if I were to pick a title for this book, I would chose "Fun with Mathematica through Differential Geometry."

7 of 8 people found the following review helpful.
Excellent overall book
By A Customer
I strongly disagree with the reviewer at the bottom of this page. Having taken a differential geometry course last year using do Carmo's book (also excellent) I came to appreciate the intuition that this book lends to the reader. Also, this book makes greater use of elementary linear algebra than is common in some more standard texts, for example in defining the second fundamental form in terms of the Shape Operator. For students wanting to compliment their course notes or standard text with a book which will thoroughly explain both the fundamentals and isolated topics, this book is highly recommended.

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