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Differential geometry and its applications oprea pdf

The purpose of this book is to mix differential geometry, the calculation of variations and some applications (e.g., soap film formation, restricted particle movement, Foucault's pendulum) to see how geometry fits into science and mathematics. The book includes many Maple procedures that allow students to visualize geometry and calculate things like euler-lagrange equations. In particular, Chapter 5 on geodesics contains a procedure for tracing geodesics on surfaces and this procedure gives beautiful illustrations of the Clairaut relationship, for example. The same type of procedure also allows students to visualize the movement of a restricted particle to move in bowls (of various forms) under gravity. These are the types of connections between geometry and applications that I like and that I think are important for students to see. Here is an example of a geodesic on the surface of the revolution obtained by turning the Witch of Agnesi on the x-axis. Notice how the geodesic is limited between two parallels. This is the Clairaut relationship in action. By the way, the following image is just a first attempt to use maple to create a JPEG file for the web --- better things will surely come later! The image above was created by a procedure called 'plotgeo' that can be found in chapter 5 of the book. Here are some other examples of geodesics on surfaces constructed from this procedure. Geodesic in a Geodesic Torus in a Cylinder Return to Differential Geometry of Oprea's Homepage and its Applications studies the differential geometry of surfaces in order to help students make the transition from compartmentalized courses into a standard university curriculum to a type of mathematics that is a unified whole. Mixgeometry, calculus, linear algebra, differential equations, complex variables, calculation of variations and science nodes. This mix of ideas gives students the opportunity to visualize concepts through the use of computer algebra systems, such as Maple. Differential Geometry and Its Applications emphasize that this visualization go hand in hand with understanding the mathematics behind computer construction. The book is rich in results and exercises that form a continuous spectrum, from those that depend on calculus to rather abstract evidence. John Oprea was born in Cleveland, Ohio and was educated at Case Western Reserve University and Ohio State University. He received his PhD from OSU in 1982 and, after a postdoctoral degree at Purdue University, he began his tenure at Cleveland State in 1985. Oprea is a member of the Mathematical Association of America and the Mathematical Society of America. He is Associate Editor of the Journal of Geometry and Simmetry in Physics. In 1996, Oprea received the Lester R. Ford Award from MAA for his monthly article, Geometry and the Foucault Pendulum. of several various articles on topology and geometry, he is also the author of The Mathematics of Soap Films (AMS Student Math Library, volume 10), Symplectic Manifolds without Kähler Structure (with A. Tralle, Springer Lecture Notes in Mathematics, volume 1661), Lusternik-Schnirelmann Category (with O. Cornea, G. Lupton and D. Tanré, AmS Mathematical Surveys and Mongraphs, volume 103) and the upcoming Algebraic Models in Geometry (with Y. Félix ré , to Oxford University Press). MAA Press: A brand of Differential Geometry of the American Mathematical Society and its Applications studies the differential geometry of surfaces in order to help students transition from compartmentalized courses into a standard university curriculum to a type of mathematics that is a unified whole. Mixgeometry, calculus, linear algebra, differential equations, complex variables, calculation of variations and science nodes. This mix of ideas gives students the opportunity to visualize concepts through the use of computer algebra systems, such as Maple. Differential Geometry and Its Applications emphasize that this visualization go hand in hand with understanding the mathematics behind computer construction. The book is rich in results and exercises that form a continuous spectrum, from those that depend on calculus to rather abstract evidence. ... There is a good deal to like about this book: the writing is lucid, drawings and diagrams are abundant and carefully made, and the author conveys a contagious feeling of enthusiasm for his theme. -- William J. Satzer, MAA Reviews Page 2 We are offering 40% off list price on a selection of books until January 31. Click here to see the full list. Learn more debt-paying AMS members receive a free AMS eBook per calendar year. Simply put an eBook in your shopping cart, log in with your AMS credentials, and look for the View Discounts button on your shopping cart to redeem your free eBook. Join today's preface The point in this book's Book Prerequisites Book features elliptical functions and Maple Note Thank You to users of previous editions Maple 8 to 9 Note to Students Chapter 1. Curve Geometry 1.1 Introduction 1.2 Arclength Parametrization 1.3 Frenet Formulas 1.4 Non-Unitary Speed Curves 1.5 Some Implications of Curvature and Domening 1.6 Of Green and Isoperimetric Inequality 1.7 The Geometry of Curves and Maple Chapter 2. Surfaces 2.1 Introduction 2.2 Surface Geometry 2.3 Linear Algebra of Surfaces 2.4 Normal Curvature 2.5 Surfaces and Maple Chapter 3. Curvatures 3.1 Introduction 3.2 Curvature Calculation 3.3 Revolution Surfaces 3.4 A Formula for Curvature Gauss 3.5 Some Curvature Effects(s) 3.6 Delaunay Surfaces 3.7 Elliptical Functions, Maple, and Geometry 3.8 Calculating Curvature with Maple 4. 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