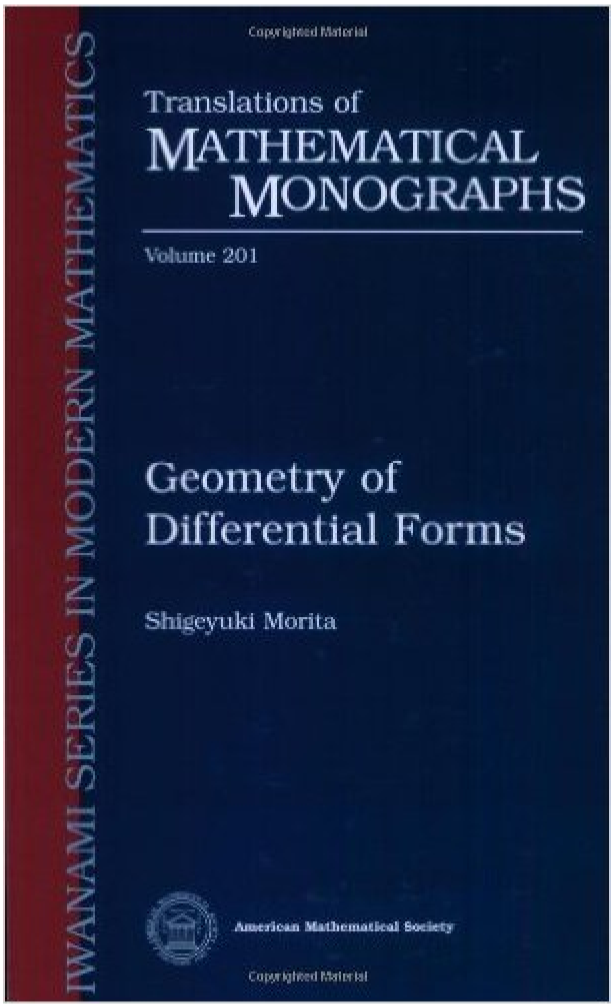
Geometry Of Differential Forms (Translations Of Mathematical Monographs, Vol. 201)



Synopsis

Since the times of Gauss, Riemann, and PoincarÃ©, one of the principal goals of the study of manifolds has been to relate local analytic properties of a manifold with its global topological properties. Among the high points on this route are the Gauss-Bonnet formula, the de Rham complex, and the Hodge theorem; these results show, in particular, that the central tool in reaching the main goal of global analysis is the theory of differential forms. The book by Morita is a comprehensive introduction to differential forms. It begins with a quick introduction to the notion of differentiable manifolds and then develops basic properties of differential forms as well as fundamental results concerning them, such as the de Rham and Frobenius theorems. The second half of the book is devoted to more advanced material, including Laplacians and harmonic forms on manifolds, the concepts of vector bundles and fiber bundles, and the theory of characteristic classes. Among the less traditional topics treated is a detailed description of the Chern-Weil theory. The book can serve as a textbook for undergraduate students and for graduate students in geometry.

Book Information

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Customer Reviews

This must be surely one of the bests if not the best introduction into the world of differential geometry (and some aspects of algebraic topology) that has been written. The author does a marvelous job of teaching and explaining the concepts for an audience that goes from mathematicians to physicists. As another reviewer pointed out it is a mathematical text but written with enough informality at some places which eases the lecture of the whole material, providing further insight and even some historical notes (like for example the fact that Ehresmann made the last contribution to date in the definition of a connection in fiber bundles). Among the things that I like to point out are that with this book I finally understood the concept of paracompactness, the support of a function, the concept of a partition of unity, etc. The clarity in the presentation of material is throughout cristal clear, I found no better place for the definition of a manifold for example or the demonstration of Stoke's theorem. Also it gives the best motivation for the equation of a geodesic, i.e. that the covariant derivative of its tangent vector must vanish, this is motivated from the case of a surface embedded in R^3, where it is explained that geodesics in the surface are the ones whose accelerator vector are normal to the surface which means that the derivative of its velocity vector tangential to the surface is zero, so the covariant derivative equal zero for the tangent vector (the velocity vector) is the generalization of this situation for a general manifold which may not be embedded in a higher dimensional space. I also like the discussion or presentation if you like of the Riemann curvature tensor.

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