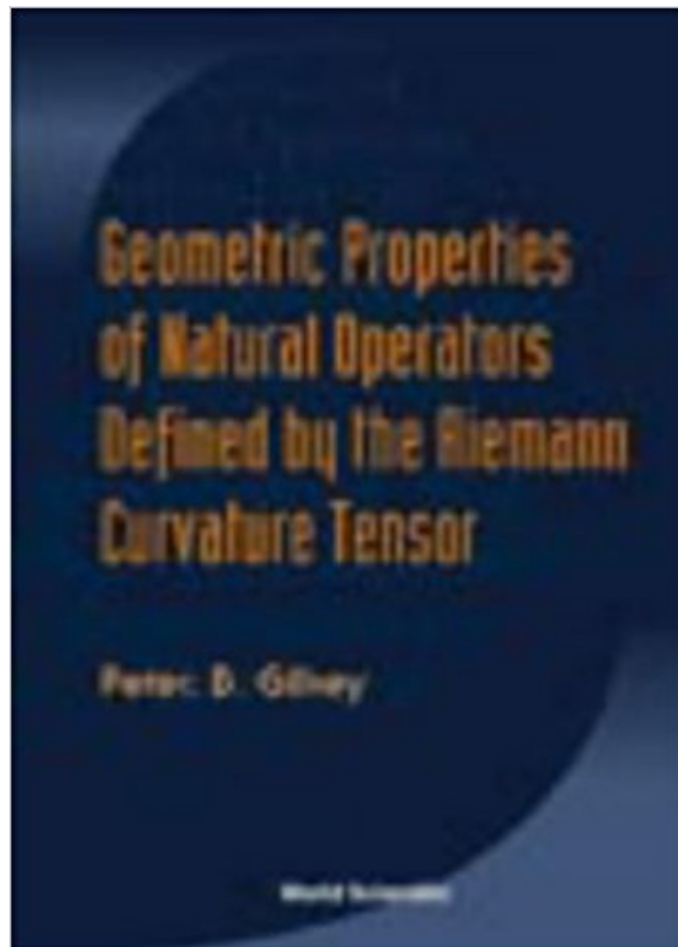




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Geometric Properties Of Natural Operators Defined By The Riemann Curvature Tensor



Synopsis

A central problem in differential geometry is to relate algebraic properties of the Riemann curvature tensor to the underlying geometry of the manifold. The full curvature tensor is in general quite difficult to deal with. This book presents results about the geometric consequences that follow if various natural operators defined in terms of the Riemann curvature tensor (the Jacobi operator, the skew-symmetric curvature operator, the Szabo operator, and higher order generalizations) are assumed to have constant eigenvalues or constant Jordan normal form in the appropriate domains of definition. The book presents algebraic preliminaries and various Schur type problems; deals with the skew-symmetric curvature operator in the real and complex settings and provides the classification of algebraic curvature tensors whose skew-symmetric curvature has constant rank 2 and constant eigenvalues; discusses the Jacobi operator and a higher order generalization and gives a unified treatment of the Osserman conjecture and related questions; and establishes the results from algebraic topology that are necessary for controlling the eigenvalue structures. An extensive bibliography is provided. Results are described in the Riemannian, Lorentzian, and higher signature settings, and many families of examples are displayed.

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This clearly written monograph will be very useful for researchers and graduate students in this field.

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