

Springer Monographs in Mathematics

Thomas E. Cecil · Patrick J. Ryan

## Geometry of Hypersurfaces

This exposition provides the state-of-the art on the differential geometry of hypersurfaces in real, complex, and quaternionic space forms. Special emphasis is placed on isoparametric and Dupin hypersurfaces in real space forms as well as Hopf hypersurfaces in complex space forms. The book is accessible to a reader who has completed a one-year graduate course in differential geometry. The text, including open problems and an extensive list of references, is an excellent resource for researchers in this area.

*Geometry of Hypersurfaces* begins with the basic theory of submanifolds in real space forms. Topics include shape operators, principal curvatures and foliations, tubes and parallel hypersurfaces, curvature spheres and focal submanifolds. The focus then turns to the theory of isoparametric hypersurfaces in spheres. Important examples and classification results are given, including the construction of isoparametric hypersurfaces based on representations of Clifford algebras. An in-depth treatment of Dupin hypersurfaces follows with results that are proved in the context of Lie sphere geometry as well as those that are obtained using standard methods of submanifold theory. Next comes a thorough treatment of the theory of real hypersurfaces in complex space forms. A central focus is a complete proof of the classification of Hopf hypersurfaces with constant principal curvatures due to Kimura and Berndt. The book concludes with the basic theory of real hypersurfaces in quaternionic space forms, including statements of the major classification results and directions for further research.

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