Methods on Nonlinear Elliptic Equations
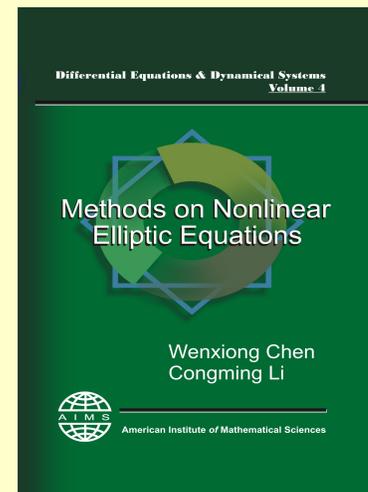
By Wenxiong Chen and Congmin Li

This book serves as a bridge between graduate textbooks and research articles in the area of nonlinear elliptic partial differential equations. Whereas graduate textbooks present basic concepts, the student can hardly get a feel for research by relying solely on such texts; by contrast, whereas journal articles present results on the forefront of research, such texts offer little, if anything, in the way of requisite background material. If this dilemma sounds all too familiar, and you would like to commence hands-on research immediately, this is the book for you; for the purpose of this text is to prepare both graduate students and young mathematicians to readily engage in research and to solve related problems.

This volume is self-contained in that it provides both background material and typical methods used in nonlinear analysis, such as:
- Sobolev Spaces on Euclidean spaces and Riemannian manifolds
- Variational methods and critical point theory
- Equations on prescribing Gaussian and scalar curvature
- Regularity of solutions
- Various maximum principles and methods of moving planes

Moreover, it presents new ideas from the research front, including:
- Regularity lifting by the combined use of contracting and shrinking operators
- The method of moving planes in integral forms

These ideas and techniques are illustrated first by simple examples, with the aid of graphs, as necessary. Then, through careful analysis of a series of recent research articles, the book leads readers to the research front and explains how these methods can be applied to solve practical problems.

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