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Nota di contenuto	Prefacing this Series -- Statement of Main Results Concerning the Divergence Theorem -- Examples, Counterexamples, and Additional Perspectives -- Measure Theoretical and Topological Rudiments -- Sets of Locally Finite Perimeter and Other Categories of Euclidean Sets -- Tools from Harmonic Analysis -- Quasi-Metric Spaces and Spaces of Homogenous Type -- Open Sets with Locally Finite Surface Measures and Boundary Behavior -- Proofs of Main Results Pertaining to the Divergence Theorem -- II: Function Spaces Measuring Size and Smoothness on Rough Sets -- Preliminary Functional Analytic Matters -- Selected Topics in Distribution Theory -- Hardy Spaces on Ahlfors Regular Sets -- Morrey-Campanato Spaces, Morrey Spaces, and Their Pre-Duals on Ahlfors Regular Sets -- Besov and Triebel-Lizorkin Spaces on Ahlfors Regular Sets -- Boundary Traces from Weighted Sobolev Spaces in Besov Spaces -- Besov and Triebel-Lizorkin Spaces in Open Sets -- Strong and Weak Normal Boundary Traces of Vector Fields in Hardy and Morney Spaces -- Sobolev Spaces on the Geometric Measure

Theoretic boundary of Sets of Locally Finite Perimeter -- III: Integral Representations Calderón-Zygmund Theory, Fatou Theorems, and Applications to Scattering -- Integral Representations and Integral Identities -- Calderón-Zygmund Theory on Uniformly Rectifiable Sets -- Quantitative Fatou-Type Theorems in Arbitrary UR Domains -- Scattering by Rough Obstacles -- IV: Boundary Layer Potentials on Uniformly Rectifiable Domains, and Applications to Complex Analysis -- Layer Potential Operators on Lebesgue and Sobolev Spaces -- Layer Potential Operators on Hardy, BMO, VMO, and Hölder Spaces -- Layer Potential Operators on Calderón, Morrey-Campanato, and Morrey Spaces -- Layer Potential Operators Acting from Boundary Besov and Triebel-Lizorkin Spaces -- Generalized double Layers in Uniformly Rectifiable Domains -- Green Formulas and Layer Potential Operators for the Stokes System -- Applications to Analysis in Several Complex Variables -- V: Fredholm Theory and Finer Estimates for Integral Operators, with Applications to Boundary Problems -- Abstract Fredholm Theory -- Distinguished Coefficient Tensors -- Failure of Fredholm Solvability for Weakly Elliptic Systems -- Quantifying Global and Infinitesimal Flatness -- Norm Estimates and Invertibility Results for SIO's on Unbounded Boundaries -- Estimating Chord-Dot-Normal SIO's on Domains with Compact Boundaries -- The Radon-Carleman Problem -- Fredholmness and Invertibility of Layer Potentials on Compact Boundaries -- Green Functions and Uniqueness for Boundary Problems for Second-Order Systems -- Green Functions and Poisson Kernels for the Laplacian -- Boundary Value Problems for Elliptic Systems in Rough Domains.

Sommario/riassunto

This monograph presents a comprehensive, self-contained, and novel approach to the Divergence Theorem through five progressive volumes. Its ultimate aim is to develop tools in Real and Harmonic Analysis, of geometric measure theoretic flavor, capable of treating a broad spectrum of boundary value problems formulated in rather general geometric and analytic settings. The text is intended for researchers, graduate students, and industry professionals interested in applications of harmonic analysis and geometric measure theory to complex analysis, scattering, and partial differential equations. Volume I establishes a sharp version of the Divergence Theorem (aka Fundamental Theorem of Calculus) which allows for an inclusive class of vector fields whose boundary trace is only assumed to exist in a nontangential pointwise sense.