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Nota di contenuto	Research on Real-time and High- precision Cracks Inversion Algorithm for ACFM Based on GA-BP Neural Network -- Identification of Tiny Surface Cracks in a Rugged Weld by Signal Gradient Algorithm using the ACFM Technique -- Visual Evaluation of Irregular Cracks in Steel by Double Gradient Fusion Algorithm using Composite ACFM-MFL Testing Method -- Design and Experiment Research of Oblique Crack Detection System for Rail Tread Based on ACFM Technique -- Design and testing of high-resolution probe arrays using Alternating Current Field Measurement technique -- Design and experimental study of inner uniform electromagnetic probe in stainless steel pipe -- Research on the detection of surface cracks on drilling riser using the chain alternating current field measurement probe array -- An electromagnetic Helmholtz-coil probe for arbitrary orientation crack detection on the surface of pipeline -- Circumferential Current Field Testing System with TMR Sensor Array for Non-contact Detection and Estimation of Cracks on Power Plant Piping.
Sommario/riassunto	This open access book serves as a comprehensive exploration of Alternating Current Field Measurement (ACFM), encompassing the

foundational theory crucial for subsequent chapters, as well as the design and testing of ACFM probes, instruments, and software. Providing guidance and serving as a reference for ACFM instrument development, the text delves into visualization research in ACFM, offering valuable insights for technical engineering applications. Nondestructive testing (NDT) emerges as a pivotal method for detecting and assessing defects, offering support for safety pre-warning and maintenance decisions in industrial structures. Originating from the 1980s, the demand for an NDT technique arose to inspect fatigue cracks at welded intersections in offshore underwater structures in the North Sea. Conventional NDT methods proved impractical in this distinct underwater environment with quantitative evaluation requirements, prompting the development of the ACFM technique by researchers in the mechanical engineering department at University College London. Over the past four decades, ACFM's theory model, inspection methods, and equipment have undergone rapid advancements, gaining widespread utilization in ocean engineering, the power industry, rail traffic, and special equipment fields. This book encompasses diverse facets, including the global development history of alternating current field measurement technology, core basic theory, signal processing methods, probe instrument development, standardization construction, and engineering applications. Serving as a valuable learning reference for students and offering fundamental theoretical guidance for scientific researchers, it also provides case introductions for engineering applications. The book aims to propel both theoretical research and practical applications of alternating current field measurement technology, contributing significantly to its popularization and widespread application.