Overview of trends in advanced ultrasonic testing

Dominique Braconnier[1], Hector Calas[2], Ewen Carcreff[1], Sylvain Deutsch[2], Fernando OJEDA[3]

[1]Research & Development, The Phased Array Company, France, [1]Ultrasound Applications, The Phased Array Company, France, [1]Research and Development, TPAC (The Phased Array Company), Spain

The realm of Ultrasonic Testing (UT) has undergone dramatic transformations in recent years, influenced by technological innovations and the growing need for more robust Non-Destructive Testing (NDT) methods. This white paper presents an exhaustive overview of current trends in advanced UT, emphasizing how these advancements are altering the landscape of inspection and testing methodologies. While various novel techniques have emerged, there has been a noticeable shift toward tomography-like methods, which provide an unprecedented level of detail and reliability in inspections. Beyond TFM, other technological advancements like Artificial Intelligence, robots and Internet of Things (IoT) integration are also making inroads into UT, providing for predictive maintenance and real-time monitoring. The paper also examines current challenges that act as roadblocks to universal implementation, including issues of standardization and complexity. As we look toward the future, the paper offers informed projections for the next decade, detailing how these advanced techniques are likely to be adapted for newer materials, more complex geometries, and industry-specific applications. Additionally, the paper sheds light on emerging research avenues that promise to address current limitations, thereby widening the scope of UT in NDT processes. Through this in-depth analysis, the paper aims to equip industry experts, researchers, and NDT professionals with a nuanced understanding of the current trends in advanced UT. This knowledge is instrumental for the adaptation and integration of these cutting-edge techniques into future applications, ensuring both efficacy and reliability in NDT operations.