

Some Advances in Researches on Electromagnetic NDE and Applications

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Some recent progresses in the theory and applications of advanced Electromagnetic Non-Destructive Evaluation (ENDE) technologies are briefly introduced in this presentation. In view of the NDE of metallic structures such as pipe and pressure vessel of nuclear power plants, fusion reactors, and NDE of new structures and materials such as the super-light porous metallic material, thermal barrier coating on gas turbine blades etc., recent developments on theories and techniques for nondestructive inspection and sizing of macro defects, quantitative valuation of residual stress and material degradation with ENDE method such as the advanced eddy current testing, natural magnetization/magnetic memory method, electromagnetic acoustic transducer method, integrated micro-magnetic NDE, laser UT and the infrared thermograph techniques are presented. The design and optimization of advanced NDE probes, high efficient numerical simulation methods and coding, quantitative damage evaluation techniques, principle of new ENDE methods, and the NDE of new material and new structures are introduced respectively in addition by some typical applications to NDE of key structures of the nuclear power plants, Tokamak fusion reactors etc. The presentation is mainly focused on the research work and results of the NDE group of Xi'an Jiaotong University, in addition with some typical new theoretical and technical advances in the ENDE technologies of the global NDT society.