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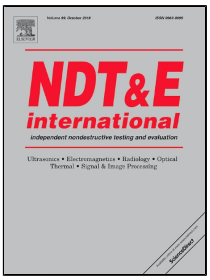

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Defect diagnosis for polymeric samples via magnetic levitation

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ABSTRACT

This paper discusses a non-destructive diagnostic method for polymeric samples using magnetic levitation and presents a novel mathematical model to investigate the relevant defect parameters. Magnetic levitation device has two anti-aligned magnets with like poles facing each other and a container of paramagnetic medium in which the polymeric sample is suspended. The principle of minimum potential energy and the Lagrange multiplier approach are employed to study the interaction between the equilibrium inclination and the internal defect. Through theoretical analysis, defective samples can be identified by the variation of their equilibrium inclinations in different paramagnetic media. The volume and location of the internal defect can be obtained by the levitation height and equilibrium inclination. To verify the accuracy of the proposed model, intact samples and defective samples with different shapes were investigated as examples. The results illustrate that the proposed method has broad application in material science and non-destructive testing.

Keywords

Magnetic levitation; Polymeric sample; Defect diagnosis; Mathematical model; Internal defect

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