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DIAGNOSTICS OF DEFECTS OF THERMAL PROTECTIONS INFLATABLE RE-ENTRY VEHICLES

Abstract

The purpose of this research was to develop experimental technique and setup for remote (non-contact) diagnostics of structural defects in elastic materials. The performance of equipment is based on nonlinear interaction of two acoustic beams of finite amplitude in investigated material. The most promising direction in further development of non-destructive diagnostics (research methods) for the elastic composite materials is to use the procedure of inverse problems. Such problems are of great practical importance in the study of properties of composite materials used as non-destructive elastic surface coating in objects of space technology, power engineering etc. The experimental equipment and the method developed could be applied for determination of material's properties; the availability of corresponded experimental facilities allows us to provide uniqueness of the solution. Elastic properties of flaws differ from ones of base medium. Gradient of elastics properties on the border of flaws results in the appearance of non-classic nonlinearity in the region. Such nonlinearity exceeds significantly the physical nonlinearity of a medium under diagnostics. Determination of spatial distribution of structural acoustic nonlinearity in the sample under investigation allows spotting the defects. In the paper the experimental technique for remote diagnostics of subsurface defects in elastic materials is considered.