Abstract

This work aims to propose an inverse methodology for the physical properties identification of sandwich beams by measured flexural resonance frequencies. The physical parameters are the Young’s modulus and the loss factor. They are estimated for each one of materials that constitute the structure of the sandwich beam which is made with the association of Hot-rolled steel, Polyurethane Rigid Foam and High Impact Polystyrene. This kind of the sandwich beam are widely used for the assembly of household refrigerators and food freezers. The solutions are obtained with parametric optimization of physical parameters of the materials that forming the sandwich beam with three methods: Genetic Algorithms (GA), Differential Evolution (DE), and Particle Swarm Optimization (PSO). Furthermore, this work intend verify the quality of the solutions obtained with parametric optimization. The parameters are estimated using measured and numeric frequency response functions (FRFs). The mathematical model to verify numeric FRF is obtained using the Finite Element Method and the two-dimensional elasticity theory coupled to three optimization methods. The results of the optimizations show that it is possible
to determine effectively the physical parameters of a sandwich beam with this methodology.

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Index Terms

Computer Science Information Sciences

Keywords

Sandwich beam, Optimization, Young’s Modulus, GA, PSO, DE.