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On the use of particle swarm optimization to maximize bending stiffness of functionally graded structures

Loja M.A.R. [a,b]

[a] ADEM/ISEL – Instituto Superior de Engenharia de Lisboa, Av. Conselheiro Emídio Navarro, 1, 1959-007 Lisboa, Portugal
[b] IDMEC/LAETA – Instituto de Engenharia Mecânica, Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal

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ABSTRACT

Functionally graded materials are a type of composite materials which are tailored to provide continuously varying properties, according to specific constituent's mixing distributions. These materials are known to provide superior thermal and mechanical performances when compared to the traditional laminated composites, because of this continuous properties variation characteristic, which enables among other advantages, smoother stresses distribution profiles. Therefore the growing trend on the use of these materials brings together the interest and the need for getting optimum configurations concerning to each specific application.

In this work it is studied the use of particle swarm optimization technique for the maximization of a functionally graded sandwich beam bending stiffness. For this purpose, a set of case studies is analyzed, in order to enable to understand in a detailed way, how the different optimization parameters tuning can influence the whole process.

It is also considered a re-initialization strategy, which is not a common approach in particle swarm optimization as far as it was possible to conclude from the published research works. As it will be shown, this strategy can provide good results and also present some advantages in some conditions.

This work was developed and programmed on symbolic computation platform Maple 14.

E-mail addresses: amelialoja@ist.utl.pt, amelialoja@dem.isel.ipl.pt.

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