Optimization of magneto-electro-elastic composite structures using differential evolution

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ABSTRACT

Magneto-electro-elastic structures are built from materials that provide them the ability to convert in an interchangeable way, magnetic, electric and mechanical forms of energy. This characteristic can therefore provide an adaptive behaviour to a general configuration elastic structure, being commonly used in association with any type of composite material in an embedded or surface mounted mode, or by considering the usage of multiphase materials that enable achieving different magneto-electro-elastic properties.

In a first stage of this work, a few cases studies will be considered to enable the validation of the model considered and the influence of the coupling characteristics of this type of adaptive structures. After that we consider the application of a recent computational intelligence technique, the differential evolution, in a deflection profile minimization problem. Studies on the influence of optimization parameters associated to the problem considered will be performed as well as the adoption of an adaptive scheme for the perturbation factor. Results are also compared with those obtained using an enhanced particle swarm optimization technique.