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THERMAL DEFORMATION SUPPRESSION OF LARGE SMART STRUCTURE VIA ACTUATORS' FORCE OPTIMIZATION

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Summary: Nowadays, the improvement of smart structures offers great prospective for use in advanced aerospace and vehicle applications which, exposed to unavoidable thermal environment. This article deals with the optimization of the multi-actuator in a smart structure in order to control the deformation caused by a thermal load. It is assumed that prescribed temperature distributions applied to the smart structure while different actuators are placed on the upper surface of the structure when some boundary conditions are imposed. The finite element analysis is used to model the smart structure and the problem simulated with Matlab. The forces for all actuators are optimized using the particle swarm optimization technique (PSO) in order to control the maximum deformation caused by the thermal load. The obtained results showed that the maximum deformation can be sufficiently reduced by the optimum design for the forces of the actuators.