On the performance of the Harmony Search algorithm in the optimization of laminated composite plates

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ABSTRACT

This paper presents an evaluation of the performance of a relatively new heuristic method called Harmony Search (HS) algorithm in the optimization of the stacking sequence of a laminated plate. The objective of the optimization is to maximize the critical bucking load of a symmetric and balanced laminated plate containing 32, 48 or 64 plies with fiber orientations of 0_2, ±45 or 90_2. The performance of the algorithm is determined based on the apparent reliability, which is used to evaluate the sensitivity of method with respect to the parameters harmony memory size (HMS), harmony memory consideration rate (HMCR) and pitch adjusting rate (PAR). Tests show that HMS has strong influence on HS performance and the best results are obtained with the higher HMS values. Less sensitivity was observed with respect to HMCR, but the PAR has a considerable effect on the apparent reliability. High levels of R were obtained with PAR values between 0.1 and 0.3. The last study investigate the effects of a linear variation of PAR during the optimization. Results indicate that PAR should be increased as the optimization advance since good reliability levels and less sensitivity to this parameter are obtained with this strategy.