



# An Improvement Study of the Decomposition-based Algorithm Global WASF-GA for Evolutionary Multiobjective Optimization\*

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**Abstract**—The convergence and the diversity of the decomposition-based evolutionary algorithm Global WASF-GA (GWASF-GA) relies on a set of weight vectors that determine the search directions for new non-dominated solutions in the objective space. Although using weight vectors whose search directions are widely distributed may lead to a well-diversified approximation of the Pareto front (PF), this may not be enough to obtain a good approximation for complicated PFs (discontinuous, non-convex, etc.). Thus, we propose to dynamically adjust the weight vectors once GWASF-GA has been run for a certain number of generations. This adjustment is aimed at re-calculating some of the weight vectors, so that search directions pointing to overcrowded regions of the PF are redirected toward parts with a lack of solutions that may be hard to be approximated. We test different parameters settings of the dynamic adjustment in optimization problems with three, five, and six objectives, concluding that GWASF-GA performs better when adjusting the weight vectors dynamically than without applying the adjustment.

**Index Terms**—Evolutionary multiobjective optimization, Decomposition-based algorithm, GWASF-GA, Weight vector