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# BILEVEL JOINT OPTIMIZATION FOR PRODUCT FAMILY ARCHITECTING CONSIDERING RECYCLE DISASSEMBLING

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**Abstract:** For effective product disassembly and recovery in the stage of product retirement, the problem of recycle disassembly design should be considered at the early stage of product development. This paper proposes a bilevel joint optimization model for the leader-follower decision-making of product family architecture and disassembly co-design by a Stackelberg game. The upper-level architecture design aims to optimization the product family modular architecture for maximizing the customer utility per cost, in which the total product cost includes design costs and disassembly costs. The lower-level disassembly design seeks for the optimal selection of disassembly scheme with the objective of maximizing the total cost utility, in which the disassembly cost includes the direct cost and indirect cost derived by environment and risk factors. The nested genetic algorithm with coding strategy is developed for this 0-1 nonlinear bilevel programming model with engineering background. A case study of automatic dishwasher product family architecting is presented to demonstrate the feasibility and potential of our proposed model and algorithm.