面向设计的产品模块划分方法 Module Partition Method for Product Design

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摘　要： 提出了面向产品设计的模块划分方法。首先对产品子结构间的功能和结构相关性进行了分析，应用模糊树图聚类算法，探讨了模块的聚类形成过程，得到多种模块划分方案。然后，基于信息熵理论，以模块化产品设计中的横系列设计复杂度、纵系列设计复杂度和更新换代设计复杂度为优化目标，建立了面向设计的模块划分方案数学评价模型，对模糊树图法聚类得到的多个方案进行评价，从而得到最合理的模块划分方案。最后，以石材花线制品加工设备为例，验证了该方法的有效性和合理性。 A module partition method for product design was proposed. Firstly, fuzzy dendrogram clustering algorithm was used to illustrate the generating process of modules based on the correlativity analysis of function and structure between the sub-structures of product and then several module partition programs were obtained. Secondly, based on information entropy theory, mathematical evaluation model of module partition program for product design which considering the complexity of cross-series design, longitudinal series design and replacement design as the optimization goal was established, by which module partition programs obtained from fuzzy dendrogram clustering algorithm can be evaluated in order to get the most reasonable module division program. Lastly, straight-lead flower-line products machining equipment was used to illustrate the validity and rationality of the proposed method.

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