عنوان مقاله:

Predictive Modeling and Non-linear Optimization Techniques for Composite Materials Design

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خلاصه مقاله:

With the rise in the use of composite materials for product design, research has been performed in determining the optimal way to produce materials for given desired outputs. As of now response surface methodology and the Taguchi method are the front running methods for optimizing material production methods at the design level. This research investigates why these methods are not a one size fits all solution to optimizing composite materials production for material properties. It proposes utilizing predictive modeling and non-linear optimization techniques from historical manufacturing data of a non-highly controlled manufacturing process. The method is examined with the manufacturing and testing data of a local concrete product manufacturer. The models and optimization methods are validated with residual values to the true data and sensitivity analysis of the problem. The initial testing of the method offers promise to companies who have not found Taguchi or surface response methodology, applicable to their specific business solutions.With the rise in the use of composite materials for product design, research has been performed in determining the optimal way to produce materials for given desired outputs. As of now response surface methodology and the Taguchi method are the front running methods for optimizing material production methods at the design level. This research investigates why these methods are not a one size fits all solution to optimizing composite materials production for material properties. It proposes utilizing predictive modeling and non-linear optimization techniques from historical manufacturing data of a non-highly controlled manufacturing process. The method is examined with the manufacturing and testing data of a local concrete product manufacturer. The models and optimization methods are validated with residual values to the true data and sensitivity analysis of the problem. The initial testing of the method offers promise to companies who have not found Taguchi or surface response methodology, applicable to their specific business solutions.

کلمات کلیدی:

Composite, Design, Modelling, Optimization, Taguchi, Sensitivity

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