An Efficient Topology-based Optimization Method of Broadband Absorbing Material

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Abstract—**Metamaterial has been applied as a new type of radar absorbing material. In the face of increasingly more complex structures, optimization algorithms have become a mainstream method for structure design. Electromagnetic simulations need a lot of time, and in order to improve development efficiency, it is necessary to reduce the use of electromagnetic simulations as much as possible. This paper proposes an efficient topology-based optimization method by combining the surrogate model and Genetic Algorithm (GA), named it as surrogate model/GA. This method uses a less complex surrogate model instead of the electromagnetic model. With sufficient database, using surrogate model greatly reduce optimization time while maintaining high accuracy. Compared with existing optimization studies, the proposed method greatly improves the efficiency. It could achieve wider absorption frequency band after the same optimization time. This method is easy to implement, it could be applied to more complex topology-based structures and the design of other metamaterials.**

Keyword— **optimization method, topology-based structure, genetic algorithm, surrogate model, kriging interpolation**

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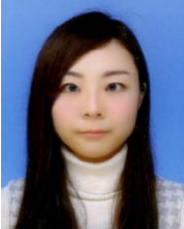
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