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Broadband Electromagnetic Scattering Analysis with Isogeometric Boundary Element Method Accelerated by Frequency-Decoupling and Model Order Reduction Techniques

Yujing Ma[1], Zhongwang Wang[2], Xiaohui Yuan[1] and Leilei Chen[2,*]

[1] College of Architecture and Civil Engineering, Xinyang Normal University, Xinyang, 464000, China

[2] School of Architecture and Civil Engineering, Huanghuai University, Zhumadian, 463003, China

*Corresponding Author: Leilei Chen. Email: chenllei@mail.ustc.edu.cn

ABSTRACT

The paper presents a novel fast calculation method for broadband Electromagnetic Scattering analysis. In this work, the isogeometric boundary element method is used to solve Helmholtz equations for the electromagnetic scattering problems. The non-uniform rational B-splines are employed to construct structural geometries and discretize electric and magnetic field integral equations [1,2]. To avoid time-consuming multi-frequency calculations, the series expansion method is used to decouple the frequency-dependent terms from the integrand in the boundary element method [3,4]. The second-order Arnoldi (SOAR) method is applied to construct a reduced-order model that retains the essential structures and key properties of the original model for large-scale problems [5-7]. Several numerical examples are presented to demonstrate the correctness and effectiveness of the proposed algorithms.

KEYWORDS

Isogeometric boundary element method; broadband electromagnetic scattering; series expansion; SOAR

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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