SHAPE UNCERTAINTY QUANTIFICATION FOR ELECTROMAGNETIC WAVE SCATTERING VIA FIRST-ORDER SPARSE BOUNDARY ELEMENT APPROXIMATION

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Abstract. Quantifying the effects on electromagnetic waves scattered by objects of uncertain shape is key for robust design, particularly in high precision applications. Assuming small random perturbations departing from a nominal domain, the first-order sparse boundary element method (FOSB) has been proven to directly compute statistical moments with polylogarithmic complexity for a prescribed accuracy [**?**, **?**], without resorting to computationally intense Monte Carlo simulations. However, implementing the FOSB is not straightforward. To this end, we introduce an easy-to-use with open-source framework to directly apply the technique when dealing with complex objects. Exhaustive computational experiments confirm our claims and demonstrate the technique's applicability as well as provide pathways for further improvement.

Keywords: Electromagnetic Wave Scattering, Uncertainty Quantification, Shape Derivative, Combination Technique, Boundary Element Methods

Mathematics Subject Classifications (2010): 47A40, 35J25, 49Q12

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