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The Method of Moments for Electromagnetic Scattering Analysis Accelerated by the Polynomial Chaos Expansion in Infinite Domains

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ABSTRACT

An efficient method of moments (MoM) based on polynomial chaos expansion(PCE) is applied to quickly calculate the electromagnetic scattering problems. The triangle basic functions are used to discretize the surface integral equations. The PCE is utilized to accelerate the MoM by constructing a surrogate model for univariate and bivariate analysis[1]. The mathematical expressions of the surrogate model for the radar cross-section (RCS) are established by considering uncertain parameters such as bistatic angle, incident frequency, and dielectric constant[2,3]. By using the example of a scattering cylinder with analytical solution, it is verified that the MoM accelerated by PCE presents a considerable advantage in computational expense and speed.

KEYWORDS

MoM; polynomial chaos expansion; radar cross-section, surrogate model; electromagnetic scattering

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