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Remarks on the Study “The Pattern Equation Method Based on the Wilcox Representation” by A.G. Kyurkchan and N.I. Smirnova

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In study [1], the authors characterize the pattern equation method (PEM) and note that certain aspects of the PEM were applied in [2–4].¹ This characterization does not raise objections to the analysis presented in studies [3] and [4], which were published substantially later than [5], the first study on the PEM. The presence of a reference to study [2], which was ignored by the author of the PEM in his previous studies on this method, can be regarded favorably. However, since study [2] had been published 22 years before the PEM was proposed, it would be more accurate to say that certain aspects of the approach from [22] were used in the PEM, rather than the reverse, although this clarification does not characterize the situation completely.

The approach proposed in [2] and briefly described in available Russian review [6], which contains reference [2], makes it possible to reduce the scattering problem to a system of linear algebraic equations (SLAE) for the unknown amplitudes of diverging spherical or cylindrical waves that propagate in the exterior of the minimal sphere or cylinder enclosing a scatterer. A specific feature of the PEM is that the integral–operator equation for the scattering pattern is derived first and algebraized only afterward. However, as a result, it turns out that the systems of linear algebraic equations obtained in the PEM coincide with the systems of linear algebraic equations obtained according to the approach from [2]. Thus, the PEM has no advantages over the previous approach proposed in [2] and the derivation of the integral–operator equation can be regarded as an optional and even unnecessary procedure used in the obtainment of the final result. Moreover, when considering in [7] the 3D vector problem of scattering by a perfectly conducting body, the author of the PEM did not derive a SLAE through the integral–operator equation, but followed the approach from [2]

without referring to this study. Since the integral–operator equation is unsuitable for derivation of the SLAE, this equation was not used in the subsequent generalizations of study [7] to magnetodielectric and impedance scatterers.

We note in conclusion that the idea of representing in [1] the sought scattered field within the framework of the PEM with the use of the Atkinson–Wilcox expansion is not new. This expansion is applied by another author in [8], where an approach similar to the PEM is described. Study [8] is not cited in [1], while the author of [8] considers the vector problem of electromagnetic scattering; this problem is more complicated than the scalar problem analyzed in [1], where the possibility of generalization of the approach from [1] to vector problems is only supposed. In addition, numerical results are presented in [8] for a cubic scatterer, rather than for the trivial case of a sphere as in [1].

REFERENCES

1. A. G. Kyurkchan and N. I. Smirnova, Radiotekh. Elektron. (Moscow) **53**, 204 (2008) [J. Commun. Technol. Electron. **53**, 190 (2008)].
2. A. Hizal and A. Marincic, Proc. IEE **117**, 1639 (1970).
3. M. Ochman, J. Acoust. Soc. Am. **105**, 2574 (1999).
4. V. B. Il'in, A. A. Loskutov, and V. G. Farafonov, Zh. Vychisl. Mat. Mat. Fiz. **44**, 350 (2004) [Comput. Math. Math. Phys. **44**, 329 (2004)].
5. A. G. Kyurkchan, Dokl. Akad. Nauk **325**, 273 (1992).
6. G. D. Malushkov, Izv. Vyssh. Uchebn. Zaved., Radiofiz. **18**, 1563 (1975).
7. A. G. Kyurkchan, Radiotekh. Elektron. (Moscow) **45**, 1078 (2000) [J. Commun. Technol. Electron. **45**, 970 (2000)].
8. A. M. Serebrennikov, IEEE Trans. Antennas Propag. **54**, 2337 (2006).

¹ These studies correspond to references [3–5] in [1].

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