ELS-XV-2015 Abstracts
ELS-XV-2015-56
Electromagnetic & Light Scattering XV 2015, Leipzig


# Analysis of the extended boundary condition method in the electrostatic case

V. Farafonov (1), V. Ustimov (1), and M. Prokopjeva (2)

(1) St.Petersburg University of Aerospace Instrumentation, St.Petersburg, Russian Federation, (2) St.Petersburg University, St.Petersburg, Russian Federation (ari-76@yandex.ru)

The extended boundary condition method (EBCM) is a popular approach of obtaining the T-matrix. Numerical calculations show that the range of applicability of EBCM should be rather limited. Earlier analytical studies of this range gave some conclusions that were not always supported by computational results. Following the suggestion of Waterman, we performed the analysis of EBCM in the electrostatic (ES) case that is similar but much simpler than the light scattering (LS) one.

We discuss the transition from the ES to LS case and present a version of ECBM for a homogeneous particle in the ES case. Our analysis is based on search for singularities of the wave fields in spherical coordinates and consideration of convergence of the field expansions in terms of the spherical functions. In the case of Chebyshev particles producing singularities of both internal and "scattered" fields, we show how these singularities (the same in the ES and LS cases) are related to solvability of the arising systems of linear algebraic equations relative to the expansion coefficients and convergence of the expansions.

We support our conclusions for Chebyshev particles by numerical calculations. We found that for these particles the system elements being some integrals can be represented by sums of the gamma-functions, which allowed us to avoid usual computational problems and the need to use an extended precision. The conclusions obtained for some other particle shapes are also discussed.