Localized Iterative Generalized Multipole Technique for Large Two-Dimensional Scattering Problems

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***Abstract*—In this work, we propose a novel and efficient solution for the *generalized multipole technique* (GMT): the *localized iterative generalized multipole technique* (LIGMT). In LIGMT, an analytic constraint is imposed on the power radiated by the set of multipole sources sharing the same origin, rendering it minimum over a given angular sector. In this way, the power radiated by each set of multipoles is confined to a different section of the scatterer surface. It follows that each set of multipole coefficients can be solved step by step via an iterative process, which circumvents the need to solve the large and full matrix equation. This implies a significant reduction of the computational and storage cost, enhancing the scope of application of the GMT method to larger problems.**

***Index Terms*—Electromagnetic scattering, equivalent sources, integral equations.**

posed by Canning [9]–[11], directional sources and testing procedures have been employed to obtain generalized impedance matrices with a banded structure. In [12], the directivity arises when the equivalent sources are arranged in such a manner as to produce a field focus on the bounding surface. In [13], [14], the directivity is achieved by positioning point sources in complex space. A similar solution has been applied in the complex multipole beam approach (CMBA) [15], [16], where the scattered fields are produced by a set of multipole sources located in complex space. Finally, in [17], [18] the directivity is achieved by choosing arrays of fictitious sources and arrays of testing points with directional radiation and receiving patterns.