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A Heterogeneous FMM for Layered Media Helmholtz Equation I: Two Layers in \mathbb{R}^2

Min Hyung Cho, Jingfang Huang, Dangxing Chen, Wei Cai

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Highlights

- Multipole expansions and translation to local expansions for far fields of free space Helmholtz Green's functions are proven to be applicable for those of half space Helmholtz Green's functions.
- Free space fast multipole method for 2-D Helmholtz equations is extended to the impedance half space, and the $O(N \log N)$ complexity is validated numerically.

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