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Michael J Nicholas* (mnichol@tulane.edu), Mathematics Department, Tulane University, 6823 St. Charles Ave, New Orleans, LA 70118. *A High Accuracy Algorithm for 3D Periodic Electromagnetic Scattering.*

We develop a highly accurate numerical method for scattering of 3D electromagnetic waves by doubly periodic structures. We approximate scattered fields using the Mueller boundary integral formulation of Maxwell's equations. The accuracy is achieved as singularities are isolated through the use of partitions of unity, leaving smooth, periodic integrands that can be evaluated with high accuracy using trapezoid sums. The removed singularities are resolved through a transformation to polar coordinates. The method relies on the ideas used in the free-space scattering algorithm of Bruno and Kunyansky. (Received September 22, 2009)