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Efficient finite-element Green's function approach for CD metrology of 3D gratings on multilayer films. YIA-CHUNG CHANG, University of Illinois at Urbana-Champaign, GUANGWEI LI, HANYOU CHU, JON OPSAL, Themawave Inc. — We present an efficient method for calculating the reflectivity of 3D gratings on multilayer films based on a finite-element Green's function approach. Our method scales like N^2 (k-space version) or $N \log N$ (real-space version), where N is the number of plane waves used in the expansion. Therefore, it is much more efficient than the commonly adopted rigorous coupled wave analysis (RCWA) method, which scales like N^3. We demonstrate the effectiveness of this method by applying it to a 2D periodic array of contact holes on a multilayer film. We find that our Green's function approach is at least one order of magnitude faster than the RCWA approach when applied to typical contact holes considered in industry. For most cases, this method is efficient enough for application as a real-time critical dimension (CD) metrology tool.

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