

Rigorous simulation of electromagnetic scattering by rough surfaces

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Rigorous methods in electromagnetic diffraction and scattering face increasingly high requirements due to advances in optical manufacturing and measurements. On the other hand, the development of computing capabilities opens ways for reformulation of well-known numerical methods and for development of others. During the last several years our group has been engaged in research of highly efficient numerical methods of the grating diffraction simulation based on the generalized sources concept. Apart from applying the methods to grating diffraction, we have developed an approach allowing one to simulate scattering by particulate layers through a rigorous diffraction simulation on periodic structures of extremely large and complex periods. This work focuses, first, on the investigation of capabilities of the generalized source method for rigorous simulation of electromagnetic scattering by rough surfaces, and, second, on the demonstration of the dramatic improvement of computing capabilities through the use of modern graphical processing units.

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