

Study on Properties of Intensity Profiles Scattered from the Self-Affine Fractal Random Surfaces: an Approximate Theory and Simulations

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Abstract: We study the properties of the intensity profiles scattered from the self-affine fractal random surfaces. We use the mathematical decay function to approximate the double negative exponent function in the rigorous theory of scattering, by letting them have the same maximum value and half-width, and the expression for the half-widths of the intensity profiles in the whole range of the perpendicular wave vector component is obtained. The previous results in the two extreme cases are included in the results of this paper. In the simulational verification, we propose a method for the generation of self-affine fractal random surfaces, using the square-root of Fourier transform of the correlation function of the surface height. The simulated results conform well with the theory.

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