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Impact of Surface Roughness on Light Absorption

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Abstract : We study oblique incident light absorption in opaque media with rough surfaces. An analytical approach with modified boundary conditions taking into account the surface roughness in metallic or dielectric films has been discussed. Our approach reveals interference-linked terms that modify the absorption dependence on different characteristics. We have discussed the limits of our approach that hold valid from the visible to the microwave region. Polarization and angular dependences of roughness-induced absorption are revealed. The existence of an incident angle or a wavelength for which the absorptance of a rough surface becomes equal to that of a flat surface is predicted. Based on this phenomenon, a method of determining roughness correlation length is suggested.

Keywords : light, absorption, surface, roughness
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