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Interference coloring of regularly scattered white light

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Abstract

Interference coloring of the regular component of a polychromatic light scattered by a colorless dielectric slab with a rough surface is considered. To explain the observed alternation of colors as the depth of roughness grows, we apply the model of a transient layer associated with surface roughness, which extends the well-known analogy between the layer and a light-scattering particle. It is shown that coloring of the forward-scattered component of a white light can be interpreted as the action of a peculiar quarter-wavelength (anti-reflecting) layer for some spectral component of a polychromatic probing beam. By applying the modern chromoscopic technique, we compare the coloring of the forward-scattered and the specularly reflected radiation. As the demonstration, the effect of "a blue Moon" and "a red Moon" caused by the spectral changes induced by white-light scattering at the rough surface of a colorless glass is represented. — *Natura simplex et fecunda*, A. Fresnel.



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