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Title:Diffuse scattering from rough surfaces in THz communication channels
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Abstract:Recent years have seen a tremendous increase in the demand for wireless bandwidth. To support this demand by innovative and resourceful use of technology, future communication systems will have to shift towards higher carrier frequencies. Due to the tight regulatory situation, frequencies in the atmospheric attenuation window around 300 GHz appear very attractive to facilitate an indoor, short range, ultra high speed THz communication system. In this paper, we investigate the influence of diffuse scattering at such high frequencies on the characteristics of the communication channel and its implications on the non-line-of-sight propagation path. The Kirchhoff approach is verified by an experimental study of diffuse scattering from randomly rough surfaces commonly encountered in indoor environments using a fiber-coupled terahertz time-domain spectroscopy system to perform angle- and frequency-dependent measurements. Furthermore, we integrate the Kirchhoff approach into a self-developed ray tracing algorithm to model the signal coverage of a typical office scenario.
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