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Title:Measurement of complex permittivity of lossy materials in free space using matched THz power meter
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Abstract:The complex permittivity of lossy materials is measured at 330 GHz by matched THz power meter. Such a power meter operates near the Brewster's angle of its absorbing film resulting in an own reflection coefficient close to zero. It permits to reduce an uncertainty associated with parasitic reflections created by conventional power meters. The measured power transmission coefficient of the dielectric slab as a function of the incident angle is used for estimating the dielectric constant. Its evaluation is based on the root-finding procedure applied to the proper formulated system of two non-linear equations. Convergence and sensitivity of this system in the space of $\{\varepsilon'_r, \varepsilon'_r\}$ are investigated in order to formulate recommendations how guess values providing the unique solution must be chosen. The results are useful for estimating sheilding effects caused by dielectric losses in the sub-mm range with application to detecting hidden objects as well as other homeland security purposes.
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