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Title:Using millimeter and terahertz frequencies for complex permittivity retrieval of low-loss materials

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Abstract:A free-space measurement method has been proposed for complex permittivity determination of low-loss materials at millimeter and terahertz frequencies. The method relies on the Fabry-Perot interference effect between two identical samples with different lengths separated by a varying air region. A metric function has been derived for fast and accurate complex permittivity determination of low-loss materials using amplitude-only transmission power data and then we performed its functional analysis to evaluate its dependence on unknown parameters. Next, we employed a graphical method for testing the number of measurements required to extract a unique permittivity. We conclude that 1) at least three independent measurements are required for one permittivity determination and 2) using samples with smaller lengths increases the robustness of the proposed method.

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