Abstracts

In situ microwave characterization of nonplanar dielectric objects

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In this paper, a novel experimental solution is presented for the nondestructive, noncontact, and in situ characterization of dielectric objects of curved shape using a spot-focused freespace measurement system. Measurements were made on Plexiglas and glass samples of cylindrical shape with different radii of curvature, and the complex permittivities were computed from the measured S/sub 21/ and S/sub 12/. Comparing the results with planar samples shows that the curvature does not significantly affect the accuracy of the measured permittivity of cylindrical surfaces if the radii of curvature are large compared to the size of the focusing spot. Results for a number of curved samples agree with the published data and this demonstrates the usefulness of a spot-focused free-space system for in situ characterization and evaluation of materials and complex structures during processing and fabrication. The other benefit of this approach is the noncontact nature of the method, which permits measurement of solids and liquids in high/low-temperature environments. The spot-focused beam permits characterization of small or large samples.

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