275. Title:Route for bulk millimeter wave and terahertz metamaterial design
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Abstract:A possible route for the design of 3-D metamaterials in the millimeter and terahertz (THz) frequency range is proposed in this paper. It consists of stacks of spatial filtering screens made of resonant subwavelength metallic elements deposited on polypropylene (PP) film substrates by a contact photolithography technique. A thorough characterization of PP films as a substrate in THz and its extension to millimeter waves is carried out. Then, a description of the fabrication process, followed by a thorough analysis of the yield of this process as well as the material properties, is reported. As a direct application, several filtering screens are studied, including the performance of multilayer configurations. It is shown that the losses do not increase significantly in the multilayer case, enabling both the fabrication and use of PP at these frequency ranges. Additionally, slow wave has been measured in a multilayer prototype. Full-wave electromagnetic simulations have been compared with measurement from several configurations, showing reasonably good agreement. These results open the possibility of implementing low-loss metamaterials in the millimeter and THz spectrum. <RECORD 16>