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Title:Time Varying Conductance in THz Photoconductive Antennas.
Authors: Neda Khiabani, Yi Huang, Yao-chun Shen and Stephen Boyes.
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Abstract: Terahertz (THz) photoconductive antennas are the most common devices for the generation and detection of THz waves. One of the main problems of the current photoconductive antennas as the emitter is that the optical-THz conversion efficiency is very low, thus it is difficult to obtain high power THz radiation. Source conductance of the photoconductive antenna is one of the primary factors which have significant effects on emitted THz power and optical-to- THz conversion efficiency. Thus, in order to assess the performance of the photoconductive antenna, proper evaluation of the photoconductive material conductance is required. In this paper, the time dependant conductivity of the photoconductive material based on a pulsed system is first derived. Then, through this conductivity, the source conductance (=1/resistance) in THz photoconductive antennas is determined which illustrates the influence of different parameters of the laser pulse, photoconductive material, and THz antenna. This new formula can aid in a better theoretical assessment of the total optical-THz conversion efficiency calculation as the source conductance can be more accurately obtained.
Keywords: Terahertz antennas, Photoconductive antennas, Source conductance, Photoconductive material, Pulsed THz system