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标题: Temporal and Frequency Evolution of Brillouin and Sommerfeld Precursors Through Dispersive Media in THz-IR Bands
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摘要: The evolution of rectangular and Gaussian pulses through dispersive media is analyzed using a frequency-domain technique, valid for any kind of modulated input signal propagated through any dispersive medium. Three different metals-aluminum, silver, and gold-are considered using the Drude dielectric model to characterize them, at operating frequencies of 1 and 100 THz. A Lorentz model was also tested in the picohertz frequency band. The frequency-domain approach facilitated to separate the different components of the signal after propagating through the dispersive medium: carrier, Brillouin and Sommerfeld fields. In combination with the electric-field intensity plots, the dynamical evolution related to Brillouin and Sommerfeld precursor has shown a different trend in the chosen media, undergoing also an opposite effect on the effective frequency deviation. The case of a finite thickness propagation medium is compared to half-space model showing differences in the precursor evolution behavior. Finally, with Drude model material parameters at an operating frequency of 100 THz, we demonstrated that the impinging wave is coupled through surface plasmon polaritons which are capable of coupling in the output facet of the finite thickness slab to radiating waves.
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