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Generating controllable frequency-comb-like structures in terahertz range via Rabi sidebands[1] ALEX FILIN, (1,2), DMITRI ROMANOV, (1,3), ROBERT LEVIS, (1,2): (1) Center for Advanced Photonics Research, (2) Department of Chemistry, (3) Department of Physics, Temple University, Philadelphia, PA 19063 — When broad, coherent Rabi sidebands are invoked by a moderately intense picosecond laser pulse, they typically exhibit spectral interference fringes. We demonstrate the possibility of controlling this fringe pattern toward a comb-like structure. We investigated the influence of the driving pulse (normalized to 1 ps FWHM) shape parameters on the structural characteristics of the sideband spectra: the spectrum envelope, the fringe contrast, and the fringe spacing variation. The envelope was found to depend drastically on the sharpness of the driving pulse, that is, on the rate at which the temporal distance between the leading and trailing edges grows away from the pulse maximum. Increase in this parameter effectively flattens the envelope. The fringe contrast, that is, the maximum-to-minimum difference, depends strongly on the asymmetry of the driving pulse. The imbalance between the driving and the trailing edges leads to fast decrease of the contrast. The variation of inter-peak distance within a sideband was controlled using super-Gaussian shape of the driving pulse. While for the Gaussian pulse the inter-peak distance increases almost 5 times over the interval from 1.60 to 1.66 eV (in the case of oxygen), sufficiently super-Gaussian shape leads to almost equidistant fringes (comb-like spectrum).

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