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Plasmons in metal contacted graphene[1] M.M. JADIDI, Institute for Research in Electronics and Applied Physics(IREAP), Univ of Maryland, College Park, A.B. SUCHKOV, Center for Nanophysics and Advanced Materials(CNAM), Univ of Maryland, College Park, R.L. MYERS-WARD, A.K. BOYD, K.M. DANIELS, D.K. GASKILL, US Naval Research Laboratory, H.D. DREW, CNAM, Univ of Maryland, College Park, T.E. MURPHY, IREAP, Univ of Maryland, College Park — Subwavelength graphene structures exhibit standing-wave plasmon resonances throughout the terahertz spectral range that can be tuned by application of a gate voltage. These features make graphene an attractive candidate for a variety of electrically tunable terahertz devices, including filters, sensors, sources, and modulators. Plasmonic modes have been observed and analyzed in finite-size graphene elements such as ribbons and disks. However, nearly all optoelectronic applications require electrical connection to the graphene element, which drastically alters the plasmonic boundary conditions and mode structure. We present a study of the effects of conductive electrical contacts on the plasmonic modes of a graphene channel, and examine how the contacts affect the coupling to and from free-space radiation. We show that radiation effects are essential in defining and understanding the properties and linewidths of these modes. We also study how the graphene plasmon mode interacts with the antenna modes of the contacts. These results provide valuable insight for designing antenna-coupled graphene plasmonic devices, including detectors and emitters.

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