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Surface Plasmon Polariton Beams with Flat Top Profiles LAUREN ZUNDEL, The University of New Mexico, ROSARIO MARTINEZ-HERRERO, Universidad Complutense de Madrid, ALEJANDRO MANJAVACAS, The University of New Mexico — Flat top beams, which are characterized by their uniform intensity and square profile shape, are well known in the context of paraxial optical beams, but remain unexplored in the field of surface plasmon polaritons (SPPs). SPPs, which have emerged as ideal platforms for the manipulation of light below the diffraction limit, are collective oscillations of the conduction electrons in a metallic material, coupled to electromagnetic waves. These excitations are able to propagate for hundreds of wavelengths while confined to a small volume around the interface between the metal and its surrounding dielectric environment. Here, we introduce and characterize, for the first time, SPP beams with flat top profiles. This is accomplished by using a set of SPP Hermite Gauss modes forming a complete basis for the solutions of Maxwells equations for a metal-dielectric interface in the paraxial approximation. We provide a comprehensive analysis of the evolution of the shape and intensity of these flat top beams over propagation distances of hundreds of wavelengths. The introduction of flat top beams brings a new element to the SPP toolbox that can enable unique coupling and excitation scenarios not possible with conventional SPP profiles.

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