Current Distribution in Flat Transparent Antennas

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Abstract—
The theory of transparent antennas made of flat Indium Tin Oxide thin films is derived and their properties are analyzed. The methodology for finding the current distribution law along such antennas for different values of the film conductivity is presented. It is shown that decreasing the conductivity of the radiating element leads to transition of the current distribution from cosine to exponential decay. Various conditions and configurations are investigated on how to slow and minute the current decay and radiation energy loss. Several configurations are studied such as narrow, self-complementary and thin antennas. It is found that for wide antennas, when the antenna's width is of the order of a quarter wavelength, the current decays slower. However, for very wide antennas, the antenna width has no effect on the current distribution.