

Optical slot antenna as a bound charge oscillator

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Optical antenna is a nanoscale miniaturisation of radio or microwave antennas that is also governed by the rule of plasmonics. We explain characteristics of optical slot antenna – strong local field enhancement, antenna resonance and emission spectrum. We introduce new notion of local capacitance and lambda-zone for the local field enhancement. In particular, we show that the transmission through a slot antenna made of rectangular shape hole in a metal film can be treated as a scattering problem. Rigorous calculations and simplifying approximations will be presented to reveal the physical nature of underlying systems. We demonstrate that light scattering by the single hole cavity can be treated as a bound charge oscillator experiencing Abraham-Lorentz force in addition to external force. Various physical issues will be discussed.