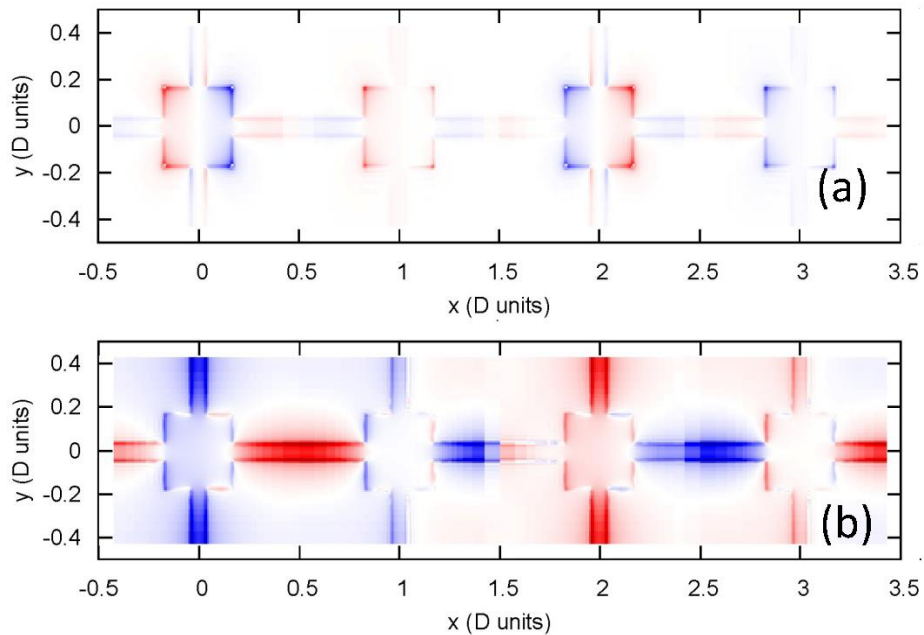


## Polarization and charge transfer resonances in wired patch-antenna arrays

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We investigated theoretically light interaction with a freestanding structure of subwavelength thin rectangular gold posts arranged periodically in a 2D-lattice. The time-domain approach used is based on an efficient pseudo-spectral solver. The transmission response of the system shows a resonant behavior corresponding mainly to the excitation of localized plasmons of individual posts. When metallic wires interconnect the posts, besides polarization resonances of individual posts (Fig. a) and wires, we emphasized the appearance of resonances which correspond to charge transfer between neighboring metallic objects of the pattern (Fig. b). The dispersion of these resonances crosses the light line, leading to propagating bound states of surface plasmon polariton character.



**Figure** *z*-component of the electric field distribution at the resonance frequency in the vicinity of the surface structure for: a) a polarization resonance ( $\lambda=450\text{nm}$ ) and b) a charge transfer resonance ( $\lambda=850\text{nm}$ ). The period of the structure is  $D=300\text{nm}$ , the thickness of the posts and wires is  $50\text{nm}$ ; here the incident light wavevector component  $k_x=G/4$ , with  $G=2\pi/D$ .