principle which states that a medium under an external influence exhibits only those symmetry elements that are common to the medium without the influence and the influence without the medium [19]. Since the perfect nanohole ensemble belongs to *p3m* planar symmetry group and circularly polarized light could be associated with $p\infty$ symmetry, the resulting electromagnetic field distribution is of *p3* symmetry.

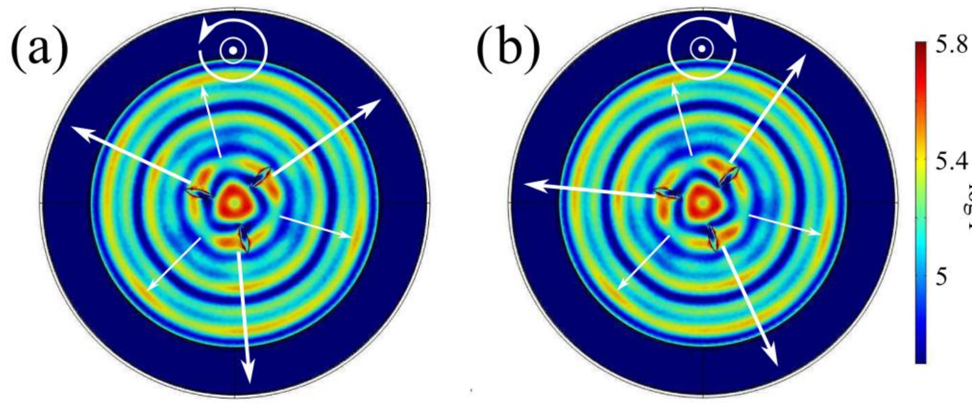

Fig. 5. Finite element simulations of the elliptical nanohole ensemble with a = 100 nm, b = 500 nm and d = 250 nm illuminated by the left-hand (a) and right-hand (b) circularly polarized light at λ = 650 nm which corresponds to experimental situation. Large arrows indicate SPP waves, which are switched with illumination polarization change, and small arrows indicate ones that do not.

As it could be seen from SNOM measurements the effect is very sensitive to the sample quality and dimensions. Only one of 20 fabricated nanohole ensembles with different *a*, *b* and *d* values was able to give pronounced evidence of handedness-sensitive SPP emission. Illumination wavelength is also crucial. It is seen in Fig. 5 by means of finite element calculations that effect is less pronounced in the experimentally studied sample than in the initially supposed one because one does not excite the shape resonance effectively using the wavelength λ = 647 nm. The performance of the device could be optimized by picking the proper size of the apertures, which governs the shape resonance position, and distance between them, which governs the interference of SPPs at a fixed wavelength. The provided data and the model are believed to confirm that mirror-symmetric plasmonic nanostructures are capable of handedness-sensitive SPP emission.

7. Conclusions

Handedness-sensitive surface plasmon polariton emission from mirror-symmetric elliptical nanohole ensembles was observed. It was shown using and scanning near-field optical microscopy and numerical calculations that direction of surface plasmons launched by the sample could be switched by changing illumination polarization from left- to right-hand circularly polarized. The established effect is supported by an analytical model and could find practical applications in new plasmonic circuitry devices.

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