Spatial symmetries in nonlocal multipolar metasurfaces (Erratum)

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It has come to our attention that the information provided in Sec. 4.3 of the our originally published article (doi 10.1117/1.AP.5.4.046001) could be confusing and misleading. We want to highlight the fact that the scattering matrix provided in Eq. (29) is valid only for a nonreciprocal system. In the case of a reciprocal system, the scattering matrix should be symmetric and thus satisfy $\overline{\overline{\mathbf{S}}} = \overline{\overline{\mathbf{S}}}^{\mathrm{T}}$. By imposing this reciprocity condition, the scattering matrix for the metasurface in Fig. 7(b) reduces to

$$\overline{\overline{\mathbf{S}}} = \begin{bmatrix} R_{11} & 0 & T_{13} & 0 \\ 0 & R_{11} & 0 & T_{13} \\ T_{13} & 0 & R_{11} & 0 \\ 0 & T_{13} & 0 & R_{11} \end{bmatrix}, \tag{1}$$

and is thus identical to that of the metasurface in Fig. 7(a) given in Eq. (28).

For obliquely propagating waves, the condition $\overline{\overline{\mathbf{S}}} = \overline{\overline{\mathbf{S}}}^{\mathrm{T}}$ is not required to impose reciprocity. This leads to different scattering matrices for the two metasurfaces in Fig. 7. The scattering matrix for the metasurface in Fig. 7(a) is then given by

$$\overline{\overline{\mathbf{S}}} = \begin{bmatrix} R_{11} & 0 & T_{13} & 0 \\ 0 & R_{22} & 0 & T_{24} \\ T_{13} & 0 & R_{11} & 0 \\ 0 & T_{24} & 0 & R_{22} \end{bmatrix}, \tag{2}$$

which corresponds to a typical birefringent system without polarization conversion. The scattering matrix for the metasurface in Fig. 7(b) is given by

$$\overline{\overline{\mathbf{S}}} = \begin{bmatrix} R_{11} & R_{12} & T_{13} & T_{14} \\ R_{12} & R_{22} & T_{14} & T_{24} \\ T_{13} & T_{14} & R_{11} & R_{12} \\ T_{14} & T_{13} & R_{12} & R_{22} \end{bmatrix}, \tag{3}$$

corresponding to birefringence with polarization conversion properties.

Also, in the originally published article, the matrix $R_y(\theta)$ in Eq. (32b) in the Appendix included an error in the central number. It was originally 0 and should have been 1, so that it reads as follows:

$$R_y(\theta) = \begin{bmatrix} \cos\theta & 0 & \sin\theta \\ 0 & 1 & 0 \\ -\sin\theta & 0 & \cos\theta \end{bmatrix}. \tag{4}$$

That matrix number was corrected in the published article on 7 August 2024.

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