Analytical model for polarization-dependent light propagation in waveguide arrays and applications

Rojas-Rojas, S.

Morales-Inostroza, L.

Naether, U.

Xavier, G. B.

Nolte, S.

Szameit, A.

Vicencio, R. A.

Lima, G.

Delgado, A.

 We study the polarization properties of elliptical femtosecond-laser-written waveguide arrays. An analytical model is presented to explain the asymmetry of the spatial transverse profiles of linearly polarized modes in these waveguides. This asymmetry produces a polarization-dependent coupling coefficient, between adjacent waveguides, which strongly affects the propagation of light in a lattice. Our analysis explains how this effect can be exploited to tune the final intensity distribution of light propagated through the array and links the properties of a polarizing beam splitter in integrated optical circuits to the geometry of the waveguides.