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Abstract

In this work, we design a type of meta-prism which can provide high-efficiency coupling between free space and optical waveguides at infrared frequencies. The meta-prism is composed of an ABA multilayer structure with a fixed total thickness. By varying the filling ratio of the components, the phase of the transmitted wave can be tuned to almost cover the whole range of [0, 2π], while maintaining a robust high transmittance at the same time. Through two examples, we demonstrate the efficient coupling of light into optical waveguides such as metal wires and optical fibers in a noninvasive way. We also demonstrate an approach to generate waveguide modes with different orbital angular momentums. The meta-prism, as a type of compact and efficient optical coupler, may have important applications in nanophotonics and optical communication.

Figures used in the abstract

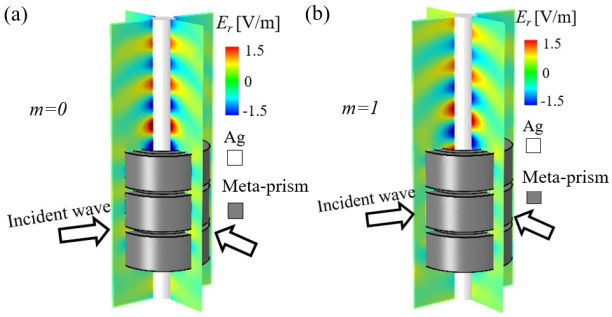

Figure 1: 耦合器将不同角动量的柱面波转换为导波的comsol仿真图