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Tailored computational methods for nanophotonics

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Abstract

General purpose computational electromagnetics techniques such as the finite-difference time-domain (FDTD) method have become widely used tools for engineering nanophotonic devices. These generic methods are capable of simulating nearly arbitrary structures, at the cost of a heavy computational burden. By contrast, we show that methods which are highly tailored to specific classes of structures can provide dramatic improvements in efficiency, and in turn, enable the efficient design and optimization of very complex structures. We present extremely compact aperiodic devices designed in this way, including wavelength division multiplexers, waveguide mode couplers, and compact multi-mode waveguide bends with no cross talk.

Biography

Victor Liu received the B.S. degree in electrical engineering from the California Institute of Technology (Caltech), Pasadena, in 2007 and the M.S. degree in electrical engineering from Stanford University, Stanford, CA, in 2009, where he is currently working toward the Ph.D. degree in electrical engineering. His current research interests include nanophotonic design and optimization, and computational electromagnetics.