Investigation on Coupling Structures Between a Strip Waveguide and a Slot Waveguide with Slabs

Background:
Optical communication provides high bandwidths to deal with today’s demand of increasing data rates. One of the key components is the Mach-Zehnder modulator (MZM), which is responsible for modulating the optical carrier. By utilizing the Pockels effect with the help of electro-optical organic compounds very efficient MZMs are implemented. While strip waveguides are commonly used in silicon photonics, slot waveguides come in handy due to the high field confinement of the optical mode inside the slot, which increases the modulation efficiency compared to a strip waveguide-based MZM. It is of great importance to have an efficient coupling between the strip waveguide and the slot waveguide. The easiest way is to use butt coupling, i.e. both waveguides don’t have any transition and are simply connected. With this kind of coupling reflections may occur, which distort the interference characteristic of an MZM and makes it difficult to evaluate the MZM’s performance. Therefore, new coupling structures shall be implemented.

Task:
Evaluating and investigating new coupling structures between a strip and a slot waveguide with slabs is part of this thesis. The emphasis lies on reducing the reflections and small footprint. By using 3D simulation tools (RSoft or CST) their characteristics shall be estimated. In the end, a layout for the most promising structures shall be created in Cadence.

The thesis may be prepared in English or German.

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