OptSim Circuit

OptSim Circuit is an extension of Synopsys' award-winning fiber optic systems modeling tool, OptSim. It delivers a single framework, engine and sets of models to study systems ranging from long-haul optical communication systems to sub-micron photonic circuits. This enables you to evaluate system-level performance in OptSim of a photonic integrated circuit (PIC) that is designed in OptSim Circuit. It is an ideal platform to study optical systems and photonic circuits that operate with coupling and feedback of different optical and electrical signal paths.

Benefits

- Innovative tool for the design automation of next-generation photonic integrated circuits (PICs)
- Reusable user-defined components and compound components
- Options for exporting data and for co-simulation with external tools
- Intuitive graphical user interface
- Powerful options for data visualization, plotting and management of project resources
- Intuitive representation of repeating and hierarchical elements helps you create PIC layouts quickly and efficiently

Applications

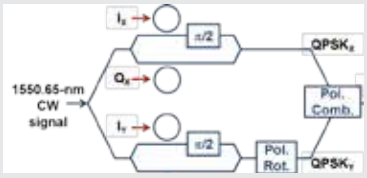
OptSim Circuit is ideally suited for computer-aided design of PIC applications and bidirectional systems, including but not limited to:

- Single- and multi-stage bidirectional PICs
- Integrated transceivers
- Integrated network subassemblies and switching fabrics
- FFTx/PON
- Microwave photonics
- Optical interconnects
- Sensing technologies, including interferometric fiber optic gyroscopes

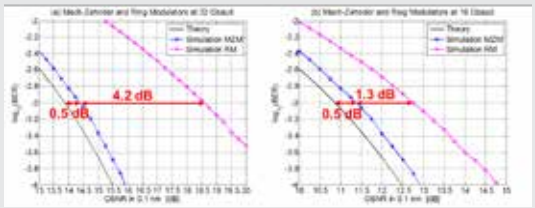
Featured Application

Simulation of a silicon photonic PIC and analysis of its performance at the system level[1]. Performance analysis for the PIC is carried out for 32- and 16-GBaud polarization multiplexed quadrature phase shift keying (PM-QPSK). Comparison is made in terms of optical-signal-to-noise-ratio (OSNR) penalty for transceivers based on lithium niobate ($LiNbO_3$) and silicon photonic (SiP) microring modulators.

OptSim Circuit transceiver topology



Schematic of the transmitter PIC

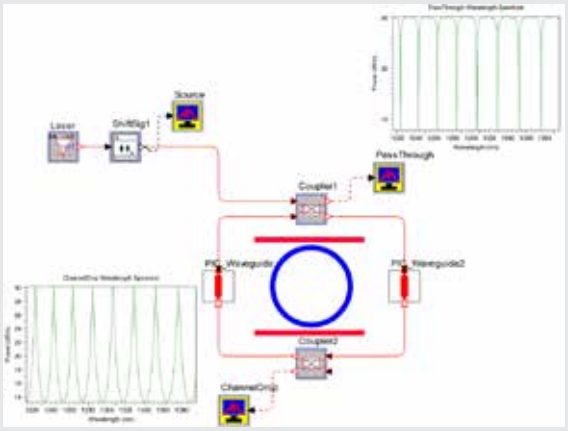


PIC performance in terms of OSNR penalty for 32 GBaud (left) and 16 GBaud (right) cases

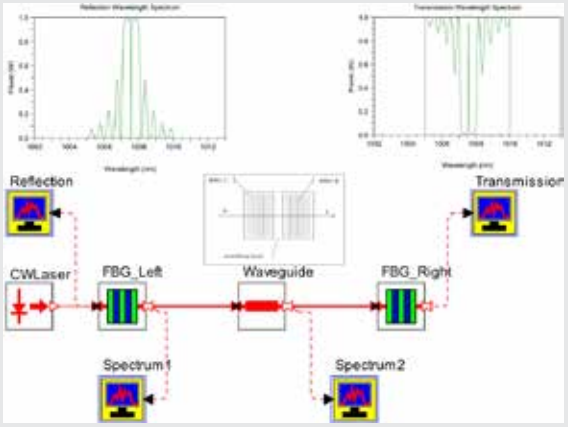
[1] E. Ghillino, P. Mena, V. Curri, A. Carena, J. Patel, D. Richards and R. Scarmozzino, "Simulation of Silicon Photonic Coherent PM-QPSK Transceivers Using Microring Modulators," 16th International Conference on Transparent Optical Networks (ICTON), July 6-10, 2014, Graz, Austria.

Features

- Extends OptSim's system modeling capabilities to include PICs
- Models complex signal interactions, such as forward and backward propagating reflections and resonance
- Models bidirectional propagation for both optical and electrical signals
- Models multipath Interference (MPI) from network and PIC elements
- Includes library of PIC elements such as bidirectional waveguides, bidirectional couplers and connectors, light sources, modulators, phase shifter, ring resonator, ring modulator and photo diodes
- Includes measurement and plotting tools, such as optical and electrical scopes, signal, spectrum and eye diagram analyzers, Q-factor and BER estimators, power meters, and more



OptSim Circuit project layout of a ring resonator PIC



OptSim Circuit project layout of an optical notch filter PIC

SEE PAGE 43 FOR SYSTEM REQUIREMENTS