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Silicon to Software™

RSoft Application: Arrayed Waveguide Grating (AWG)

Efficient AWG Multiplexing Technology Modeling and Analysis

Overview

IMEC, a leading European research and foundry organization, needed to extend silica AWG multiplexing technology to a silicon-based, on-chip platform.

The Challenge

AWGs are complicated structures with many parameters to be analyzed, such as free spectral range, crosstalk, channel spacing, channel bandwidth, footprint, and channel insertion loss/uniformity. AWG geometry used in a photonic design has a big impact on device performance. Due to an AWG's large structure size and wide spectral range, efficient simulation tools are needed for AWG design. The RSoft™ AWG Utility™ and BeamPROP™ tools are ideal solutions for this challenge.

The Solution

The AWG Utility, included with BeamPROP, produces an AWG design and mask layout based on user-specified parameters such as channel spacing, center wavelength, number of input/output ports, materials, polarization, and waveguide cross-section. The AWG Utility simulates spectral response for each output port, insertion loss/uniformity, and crosstalk. Device performance versus any design parameter (geometric, material, etc.) can also be studied to find optimal device configuration. A BPM-based solution such as BeamPROP is much more efficient at modeling AWG structures than other simulation algorithms such as FDTD.

The Result

The AWG Utility's simulated spectral response agreed very well with measured spectra. Flat top spectral was designed by using wider channel technique. A 2D EIM BPM simulation took approximately 10x less time than 3D BPM. A 2D or 3D FDTD-based simulation would take several orders of magnitude more time compared to BPM.

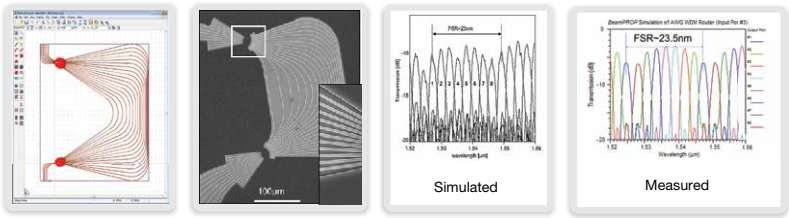

Figure 1. The BeamPROP simulation of IMEC's AWG correlated closely with measured results. Source: Bogaerts, et.al., JSTQE,12,6,pp1394 (2006)

For more information, please contact Synopsys' Optical Solutions Group at (626) 795-9101, visit http://optics.synopsys.com/rsoft/, or send an e-mail to rsoft_sales@synopsys.com.

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06/24/16.CS7396_RSoft App_C_sipAWG_CS.