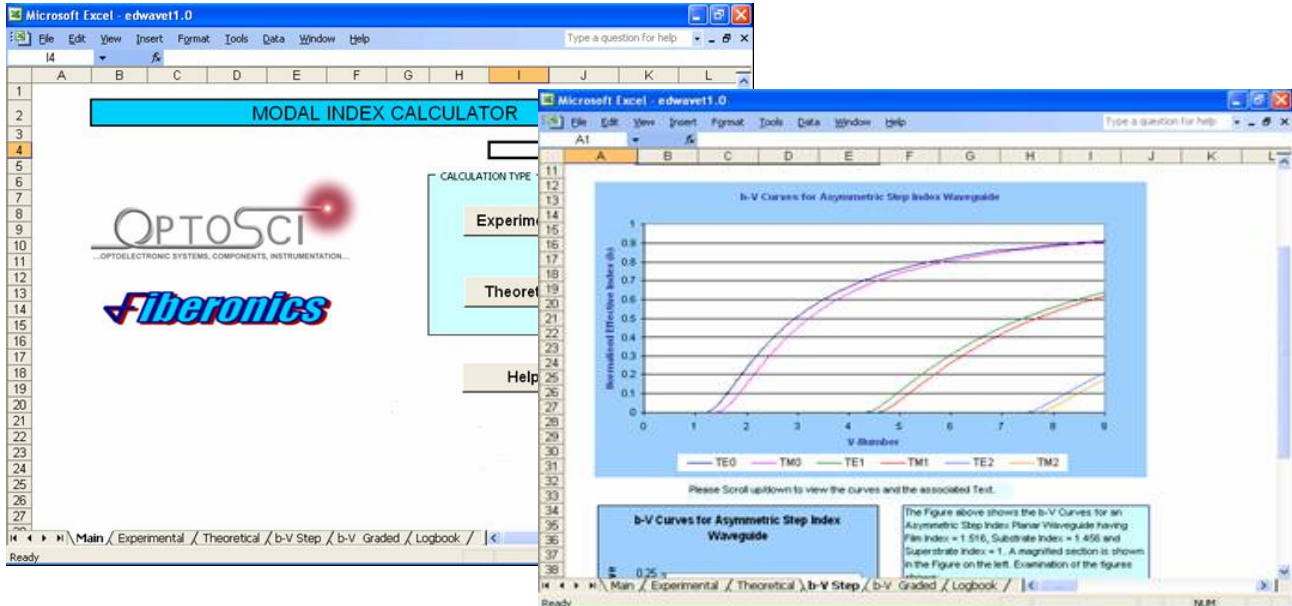


## MODAL INDEX CALCULATOR – SWAN (MIC)

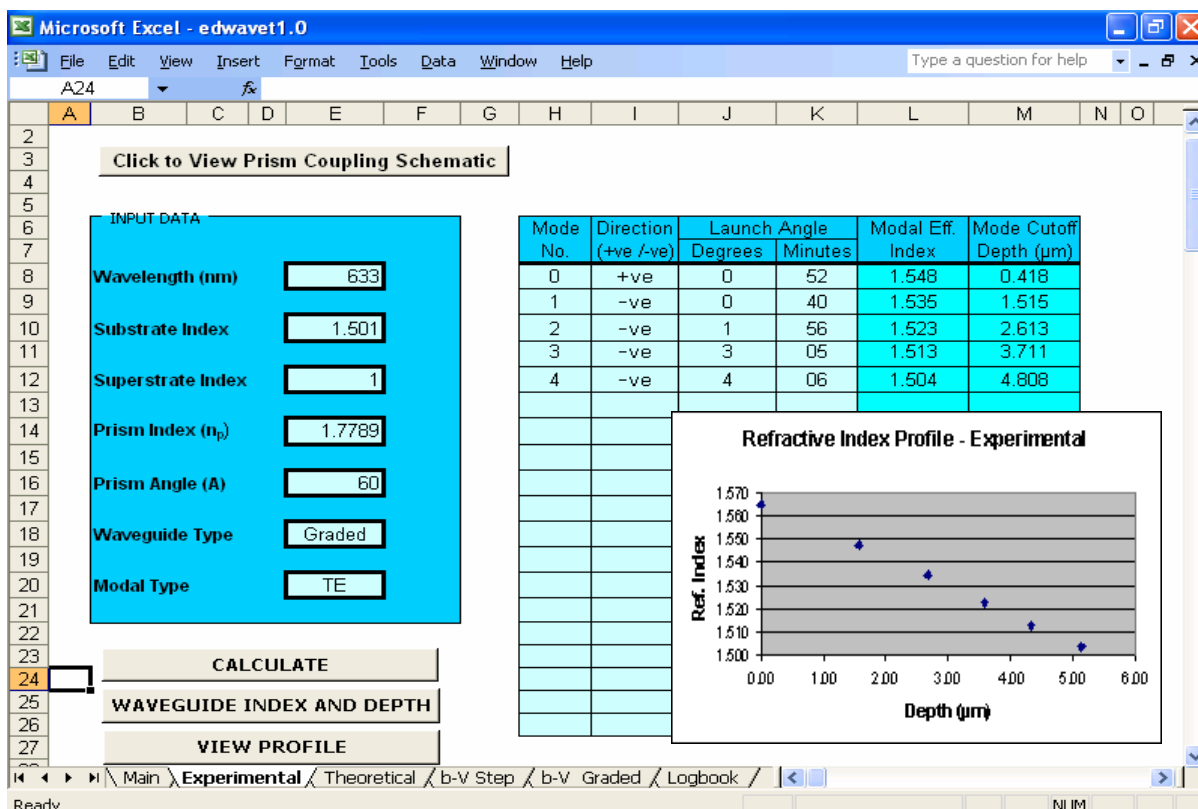
### PLANAR OPTICAL WAVEGUIDE ANALYSIS EXPERIMENTAL AND THEORETICAL



This MS-Excel based Optical Waveguide Analysis Software has been developed for use with, and to complement, OPTOSCI's "Principles of Optical Waveguiding" (ED-WAVE) Educator Kit and the "Optical Waveguiding Module" (WAVE). It provides a simple tool for studying planar optical waveguides experimentally and theoretically. Some features and benefits of this resource are: -

- The software enables the Instructor to quickly and easily check the results obtained by students from the experiments performed with the ED-WAVE Educator Kit/ WAVE Module. The Theoretical section provides a platform for the user to change all of the significant design and material parameters to answer "what if" questions about their influence on the waveguiding behaviour of planar optical waveguides to aid in classroom study.
- A set of numerically generated b-V curves for both step and graded index planar optical waveguides are provided to aid the Instructor in explaining optical waveguiding in symmetric and asymmetric step index planar waveguides and asymmetric graded index planar waveguides, including the concept of 'Single Polarisation Single Mode' waveguides.
- Refractive Index profile generation for Graded Index waveguides directly from experimental data.
- No programming is required in this easy to use package.
- Results can be saved and retrieved easily using MS-Excel features to enable preparation of reports and/or presentations using MS-Word and/or MS-Powerpoint, respectively.
- Help feature provides immediate assistance to the user regarding using the software, optical waveguide theory and applications, Step and Graded Index Waveguides and Prism Coupling method.
- Easy navigation between the Excel worksheets.
- Realistic multi-user licence prices.

Details provided overleaf



## Experimental

This section enables calculation of the modal effective indices and respective cutoff depths of the TE and TM modes supported by step or graded index waveguides. These calculations are made from measured values of the mode coupling angles obtained using the prism coupling method. The index of the guiding layer and depth of the waveguide are generated both graphically and numerically for waveguides supporting two or more modes. The refractive index profile of graded index waveguides supporting three or more modes is also generated. All of the data generated can be copied to the Logbook worksheet for further analysis by the user (e.g. curve fitting, data comparison, data assimilation etc.)

## Theoretical

This section enables theoretical calculation of the modal effective indices and respective cutoff depths of the TE and TM modes supported by the waveguide from the waveguide constants and wavelength of light. The cutoff V-number and V-number of the waveguide are also generated for step or graded index waveguides. The refractive index profile of graded index waveguides supporting three or more modes is also generated assuming a linear variation of refractive index in the guiding region of the waveguide. All of the data generated can be copied to the Logbook worksheet for further analysis by the user (e.g. curve fitting, data comparison, data assimilation etc.)

## b-V Curves

A set of numerically generated curves showing the variation of Normalised effective refractive index ( $b$ ) as a function of the normalised film thickness ( $V$ ) for TE and TM modes supported by symmetric and asymmetric step index and asymmetric graded index waveguides, respectively, are provided. This enables the user to understand the importance of V-Number as regards modes supported by optical waveguides and introduces the concept of V-Number constraints for Single Polarisation Single Mode operation of an asymmetric optical waveguide.

## System Requirements

SWAN (MIC) requires a Pentium-class PC running Microsoft Excel versions '97 - 2003, with a CD drive.

## Ordering Information

|                                 |  |
|---------------------------------|--|
| SWAN (MIC) – Multi-User Licence | MS Excel Based Software for ED-WAVE & WAVE       |
| ED-WAVE                         | Principles of Optical Waveguiding - Educator Kit |
| WAVE                            | Optical Waveguiding – Module                     |

Since OPTOSCI are committed to continuously improving the design and performance characteristics of our products, these specifications are subject to change without notice.

Date: June 2011