

Interest Group Stream: *Australian Conference on Fibre Optic Technology*

Title: *Automatic Synthesis of Microstructured Holey Fibre Designs using Numerical Optimisation*

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Abstract

Microstructured optical fibres have generated enormous interest since they were first developed because of the unique optical properties they exhibit. Examples include the development of single-moded fibres with large mode field diameters and fibres for supercontinuum generation.

The design of these fibres for applications such as dispersion control over a range of wavelengths is conceptually difficult because of the complex relationship between the structure of the fibre and its resulting characteristics. Numerical optimisation schemes have traditionally been used to solve problems of this kind, which involve non-linear multi-dimensional search spaces.

In this investigation we have employed numerical optimisation techniques in order to synthesise holey fiber designs providing single mode waveguides with specified dispersion characteristics. Simple gradient-based optimisation schemes are compared to stochastic methods including simulated annealing and evolutionary algorithms. A finite element method has been used to simulate the electromagnetic properties of the holey fiber designs. Data gathered during design optimisation has been examined in order to assess the sensitivity of the optimal solutions to manufacturing imperfections.