

พิมพ์ต้นฉบับบทความวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

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KIT MUNTAVIJAK: EIGENMODE ANALYSIS OF AXIALLY SYMMETRIC OPTICAL FIBERS BY THE FINITE ELEMENT METHOD. THESIS ADVISOR: TUPTIM ANGKAEW, D.Eng. 92 pp. ISBN 974-636-303-4.

This research has the objective to study analysis electromagnetic wave in optical fiber by finite element method. A mapping technique is proposed to transform the finite element method of the open region into bounded region. In this method, the finite element that apply mapping technique in the open region are more accurated using fewer number of elements.

A variational expression using the electric field components as the trial function is presented. This thesis is restricted for refractive index of optical fiber that axially symmetric. The problem of pattern of the optical fiber are divided into three domains: the core domain (bounded region), the cladding domain (bounded region), and the outer domain (open region). The outer domain, mapping technique are applied together with finite element method. The mapping technique function that presented are

1. natural logarithm function
2. exponential function

In this research, the propagation characteristics in optical fiber are analysed. The solution that used for solving the accuracy of mapping technique is the normalize propagation constants by trial at any normalize frequency. The refractive-index pattern are step-index fiber and grad-index fiber pattern.

The results of research found that the finite element method applied mapping technique with natural logarithm function and exponential function in outer domain is the efficiency method for testing accurated answer. Especially, testing near cutoff frequency function of mapping technique with natural logarithm is more accurated than exponential function. So that the finite element method applied mapping technique with natural logarithm function is the most efficient in this research.

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