

{tag}

{/tag}

IJCA Proceedings on International Conference
on Emerging Trends in Informatics and Communication

© 2016 by IJCA Journal

ICETIC 2016 - Number 1

Year of Publication: 2016

Authors:

Bishuddhananda Das

Sankar Gangopadhyay

Tapas Ranjan Middy

{bibtex}icetic4002.bib{/bibtex}

Abstract

An optically pumped doped fiber amplifier has emerged as an important device in all optical technology. It provides broad band amplification in case of multi-channel optical signals. Fibers belonging to low V number are important from the point of view of evanescent field coupling. Accordingly, for study of such fibers in all optical technology, one needs to investigate the response of doped fiber amplifier in the low V region. Therefore, knowledge of fundamental

modal field in doped single-mode fiber of low V number is essential to extend the study in the field of variation of modal intensity with radial distance from the axis of the fiber. This study is extremely important in the context of processing information. Using the simple but accurate power series expression for fundamental mode of graded index fiber in the low V region, we predict how the modal intensity varies with radial distance in case of both signal and pump. Choosing some typical step and parabolic index fibers of low V number, we show that our estimations agree with the exact results. Our formalism involves prescription of analytical formulation of the concerned parameters and the execution involves little computation. Thus the present method will be extremely user friendly with the system users.

Refer

ences

- A. Ghatak, K. Thyagarajan, Introduction to Fiber Optics, Cambridge University Press, UK, 1999.
- S. I. Hosain, I. C. Goyal, A. K. Ghatak, "Accuracy of scalar approximation for single mode fibers," Opt. Commun. , Vol. 47, pp. 313-316, 1983.
- A. Ankiewicz, G. D. Peng, "Generalised Gaussian approximation for single mode fibers," IEEE J. Lightwave Technol. , Vol. 10, pp. 22-27, 1992.
- P. K. Mishra, S. I. Hosain, I. C. Goyal, A. Sharma, "Scalar variational analysis of single mode graded core W-type fibers," Opt. Quant. Electron. , Vol. 16, pp. 287-296, 1984.
- S. I. Hosain, A. Sharma, A. K. Ghatak, "Splice loss evaluation for single- mode graded index fibers," Appl. Opt. , Vol. 21, pp. 2716-2721, 1982.
- S. Gangopadhyay, M. Sengupta, S. K. Mondal, G. Das, S. N. Sarkar, "Novel method for studying single-mode fibers involving Chebyshev technique," J. Opt. Commun. , Vol. 18, pp. 75-78, 1997.
- S. Gangopadhyay, S. N. Sarkar, "Confinement and excitation of the fundamental mode in single-mode graded index fibers: Computation by a simple technique," Int. J. Opt. electron, Vol. 11, pp. 285-289, 1997.
- S. Gangopadhyay, S. N. Sarkar, "Prediction of modal dispersion in single- mode graded index fibers by Chebyshev technique," J. Opt. Commun. , Vol. 19, pp. 145-148, 1998.
- S. Gangopadhyay, S. N. Sarkar, "Evaluation of modal spot size in single- mode graded index fibers by a simple technique," J. Opt. Commun. , Vol. 19, pp. 173-175, 1998.
- S. Gangopadhyay, S. Choudhury, S. N. Sarkar "Evaluation of Splice loss in single-mode graded index fibers by a simple technique," Opt. and Quant. Electron. , Vol. 31, pp. 1247-1256, 1999.
- P. Patra, S. Gangopadhyay, S. N. Sarkar, "A simple method for studying single-mode graded index fibers in the low V region," J. Opt. Commun. Vol. 21, pp. 225 – 228, 2000.
- P. Patra, S. Gangopadhyay, S. N. Sarkar, "Evaluation of Petermann I and II spot sizes and dispersion parameters of Single-Mode graded index fibers in the low V region by a simple technique," J. Opt. Commun. , Vol. 22, pp. 19-22, 2001.

- P. Patra, S. Gangopadhyay, S. N. Sarkar, "Confinement and excitation Of Fundamental mode in single-mode graded index fibers of low V number: Estimation by a simple technique," J. Opt. Commun. , Vol. 13, pp. 166-171, 2001.
- K. Thyagarajan, C. Kakkar, "S-band single-stage EDFA with 25-dB gain using distributed ASE suppression," IEEE Photonics Technol. Lett. , Vol. 16, pp. 2448-2450, 2004.
- B. Pederson, "Small-single erbium-doped fiber amplifiers pumped at 980 nm: a design study," Opt. Quantum Electron. , Vol. 26, pp. S237-S244, 1994.
- K. Kamila, A. K. Panda and Sankar Gangopadhyay, A simple but accurate method for study of radial variation of pump and signal intensities in single-mode erbium-doped dispersion-shifted as well as dispersion-flattened fiber amplifier, Optik, Vol. 124, pp. 6167-6171, 2013.
- A. Bose, S. Gangopadhyay and S. C. Saha, "A simple but accurate technique of predicting radial variation of pump and signal intensities in erbium-doped graded index fiber amplifier for propagation of first higher order mode" Optik, Vol. 123, pp. 377-380, 2013.
- J. Shijun, "Simple explicit formula for calculating the LP₁₁ mode cutoff frequency," Electron. Lett. , Vol. 23, pp. 534-535, 1987.
- P. Y. P. Chen, "Fast method for calculating cut-off frequencies in single-mode fibers with arbitrary index profile", Electron. Lett. , Vol. 18, pp. 1

Computer Science

Index Terms

Power Electronics

Keywords

Single-mode Graded Index Fiber Erbium-doped Fiber Amplifier Fundamental Modal Intensity Chebyshev Technique
Low V Region

