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Characteristic study of multimode directional coupler by elliptical point contacts and CMT

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The performance of multimode directional coupler is investigated using new technique of simplified coupled mode theory integrated with elliptical point contacts. The performance of the directional coupler is studied on the dependency of the fibers' coupling lengths and distances between the two fibers' cores. Coupling efficiency is obtained by coupling coefficients, operating wavelength, numerical apertures and the properties of the PMMA multimode fibers. The fibers are initially etched at the middle sections. Both the fibers are then attached to geometrical blocks with certain radii and the middle tapered sections are then brought into closed proximity and they are lapped to each other. The different radii of circular blocks are used to investigate the effect of macrobending of the fibers which will help the transfer of energy from fiber A to fiber B. A particular amount of load F is mounted on the other side of the geometrical blocks to provide some force or stress onto the fibers which leads to certain coupling length between the fibers. Various coupling lengths and distances between the two cores that are given by load F will give different coupling efficiencies. The coupling efficiency is studied analytically using coupled mode theory and the force given by Hertz's Law of contact mechanics. Maximum coupling obtainable, according to analytical estimation and the method used is about 70% efficiency which gives the optimum efficiency for multimode directional coupler. The parameters used in the study can be varied so that it can also be used as an optical multi-switch.

Biography

L S Supian received the BE degree in Electrical and Computer Engineering from Stevens Institute of Technology, New Jersey, USA, ME degree in Communication and Computer from Universiti Kebangsaan Malaysia, Bangi, Malaysia in 2009 and 2011 respectively. In 2012, she joined the Computer and Network Research Group in the Faculty of Engineering, Universiti Kebangsaan Malaysia as a graduate PhD student in optical communication in short communication field to be specific. Her research interests include polymer optical fibers technology, optical waveguide and short haul communication system.

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