Faculty of Electrical Engineering & Computer Science
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Investigations on Optical Amplifier

ABSTRACT - Masterthesis

Optical amplifiers are widely used in the data transmission. As the data traffic increases, despite the rapid development in optical transmission technologies, the limits of the transmission capacity available with the conventional erbium-doped amplifiers (EDFA) and modulation techniques are almost reached. The objective of this thesis is to introduce new fiber-optic amplifiers to optical communication to sustain the future growth in data traffic and also to bring down the size and cost of the transmission equipment. The performance analysis and scalability of the optical amplifiers are examined through simulation and experimental set-up.

In this thesis, we investigate the amplification characteristics of L-band (1565-1625 nm) erbium-doped fiber amplifier (EDFA) by employing the 980 nm bi-directional pumping configuration. L-Band EDFAs are significant due to recent implementation of the L-band for data transmission. With parallel use of C-band (1530 nm - 1565 nm) and L-band EDFAs will expands the amplification wavelength region. The amplification characteristics in the 1560-1580 nm wavelengths are studied by adjusting the length of the erbium doped fiber (EDF). The L-band EDFA exhibited a high signal gain of 29.15 dB and a noise figure of 7 dB for a 1565 nm signal at -25 dBm input signal power and also showed saturated output power of 10.55 dBm. We also used simulation tools to investigate the characteristics of L-band EDFA. The simulation results agree with the experimental data.