IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advances in Space-based Communication Technologies, Part 2 (6)

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DEMONSTRATION OF 40GB/S WDM SIGNAL TRANSMISSIONS WITH OPTICAL PHASED ARRAYS SYSTEM

Abstract

The laser communication technique for satellite communication has been attracting considerable attention. Optical communications can offer higher data rates than current radiofrequency communications. A High Throughput Satellite (HTS) currently use RF feeder link, but RF feeder link deficient band width for broadband data communication in future. The laser communication expected to transfer broadband data. The optical ground-to-satellite links suffer from atmospheric disturbance. The atmospheric disturbance causes deterioration of optical link quality. The propagation of non-gaussian beams produced with optical phased array has been estimated less affected by atmospheric turbulence than a single gaussian beam. As one technique to make the modified laser beam is active phased array lasers. We demonstrate 40Gb/s wavelength division multiplex (WDM) signal transmissions of 1m with optical phased arrays system. A Phased Array Lasers (PAL) transmitter output phased lock laser from 2 element. Each element output power is 15dBm. The signal is 4 WDM and the wavelength are Ch32, Ch33, Ch35 and Ch36. A Ch34 is used for optical phase detection. This channel is optical phase reference for other wavelength signals. All wavelength output from each element. This technique is multi wavelength coherent beam combining (CBC). This technique can't compensate for difference of optical path length in each element feedback path. We use the fresnel reflection of reference laser in collimator lens array for optical phase lock. It can compensate optical phase at edge of collimator lens array and reduce the phase difference between each output. This configuration can use fiber optics instead of special optics. It reduces the precise optical alignment works. We demonstrate signal transmission in this configuration that the total signal capacity is 40Gb/s with active phase controlled coherent combine. A Tx laser modulated by mach zehnder modulator (MZM). The modulation is intensity modulation. A Rx signal amplified by EDFA input before photodiode. Each wavelength channel transmit 10Gb/s PRBS $2^31-1patternfrombiterrorratetesterandthesignalsareerrorfreetransmission(BER< 10^-11).Wehavein-orbittestplanofcoherentlaserboardforthissystem.TheboardbuiltintoSmallSat.$