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Number 1 **June 2006**

THE INFLUENCE OF ATMOSPHERIC TURBULENCE ON IMAGE TRANSFER BY SPATIALLY MODULATED LASER RADIATION.

E. Ferdinandov, B. Pachedjieva, B. Todorov **1**

The influence of atmospheric turbulence (AT) on the functioning of a laser communication system for image transfer by transverse spatial modulation of the radiation is considered. The results from [1] concerning minimum aperture dimensions and the statistical characteristics of the optical signal intensity in the receiving aperture are used. Analytical expressions for the statistical characteristics of the intensity of noise spatial fluctuations caused by AT are found. The transfer function of analog optical processor for optimal filtration of the signal image in the receiving aperture from the additive mixture with the noise field is determined. Expressions have been found for the optimal filtration efficiency and the signal-to-noise rations at the filter input and output for different AT degrees. The theoretical conclusions have been used in numerical examples. Analysis of the investigation results is performed.

CONVENTIONAL ORDER STATISTIC-CFAR ANALYSIS IN WEIBULL CLUTTER

S. M. Salih, N. K. Uzunoglu, Al Y. Fattah **13**

The performance of Cell Averaging-Constant False Alarm Rate (CA-CFAR) degrades rapidly in nonideal conditions caused by the presence of a strong target signal in one of the reference cells. The Order Statistic-CFAR (OS-CFAR) is used to eliminate the reference cells with a strong input. The performance of the Conventional-Order Statistic (Conventional-OS) detector is evaluated to determine the signal-to-clutter ratio required achieving a particular probability of detection in clutter environments whose amplitude statistics are modelled by the Weibull distribution, and where the clutter dominates receiver noise. The performance is evaluated in both homogeneous and nonhomogeneous clutter. The analysis shows that the Conventional-OS detector is quite robust against the clutter edge effect.

PLANAR VACUUM DIODE WITH MONOENERGETIC ELECTRONS

D. G. Stoyanov **35**

The paper analyses volt-ampere characteristics of a planar vacuum diode with mono-energetic electrons, emitted by the cathode (an electron beam). The movement of the electron beam in the volume of the diode is described. An analytic dependence of the volt-ampere characteristics in an unlimited and limited by the field mode of the electron beam is derived.

BIT RATE AND LOSSES LIMITATIONS IN SINGLE MODE FIBER

L. A. Al-Mayahi, A. Y. Fattah **49**

In a WDM system a laser with only one line in its spectrum is needed, so the linewidth of laser must be specified. The required linewidth will depend on the number of channels and bit rate in the proposed system. In general the narrower the linewidth the better but this will usually be a cost/benefit tradeoff. In this paper the limitations of bit rate and losses in single mode fiber are studied, and propose the perfect limitation that is used in the optical design. All simulation was implemented using programs written in MALTAB 7 .

AC CURRENT PULSE - WIDTH CONTROL REGULATOR WITH LINEAR REGULATION

Evelin Tsonev, Ivan Simeonov **61**

In this paper a method of operation of an ac regulator is presented with a pulse - width control of the keys in which a linear dependence between the active power in the regulator load and the regulation angle as well as between the first harmonic amplitude of the voltage in the load and the regulation angle is achieved. The method allows a more accurate control of the processes in the system - AC regulator - load and a voltage minimization distortion in the network at relatively high powers.

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Number 2 **December 2006**

DESIGN ULTRA WIDEBAND USING RAMAN AMPLIFIERS IN WDM SYSTEMS

L. A. Al-Mayahi, A. Y. Fattah **69**

With the steadily increasing demand for fiber-optic communications, researches is more and more being placed in the method known as wavelength division multiplexing, or WDM. The key device supporting WDM technology is the optical amplifiers, and such amplifiers need to have a flat gain spectrum. In this paper, we will design Ultra wideband system that improved gain-flatness of a Raman amplifier while maintaining a wide gain-bandwidth and a high gain-output power in WDM

systems [1] [2]. All simulation was implemented using the Optical Simulation software package.

OPTOELECTRONIC REPEATER – COUPLER WITH OPTICAL FEEDBACK FOR FIBER OPTIC AVIONICS DATA BUSES

E.-O. Narlis **85**

Optically – coupled feedback substituting the conventional feedback resistor has a number of advantages including a) elimination of the feedback resistors Johnson noise for higher sensitivity, b) elimination of feedback capacitance for higher bandwidth, and c) capability of large feedback current with low output voltage for wide dynamic range. In this paper the fiber optic feedback is presented as an improvement method for a conventional trans-impedance optoelectronic repeater – coupler active device for fiber optic networks, this last having been recently reported [1].

AVIONICS IR COMMUNICATION LINK WITH SPREAD SPECTRUM ENCODING

A. Pantelouka, E.–O. Narlis, S. Voliotis **93**

This paper describes the design details for a direct sequence spread spectrum communication system over an IR data link for aircraft flying in close formation. The transmitter and the receiver are described in details. Regarding the receiver, particular attention has been given to the very demanding synchronization aspect of the communication system. The experimental results display an important robustness of the link against the AGWN and consistency with the theoretical calculation as concerns the Bit Error Probability.

IMAGE TRANSFER BY SPATIALLY MODULATED LASER RADIATION

E. Ferdinandov, B. Pachedjieva **101**

A Laser communication system is investigated for transfer of pseudo-stochastic two-dimensional signals (images) by means of transverse spatial amplitude modulation of the carrier laser radiation. The optical channel system is structured to assure the wave-optical restoration of the initial image in the receiving aperture. The minimum aperture dimensions are analytically determined to guarantee adequate signal and spatial transformations in the optical channel. Analytical expressions for the statistical characteristics of optical intensity distribution in the receiving aperture have been derived. A particular analytical description (based on experimental data) of the intensity power spectrum has been found which is necessary for optimal filtration of the signal image from the additive mixture with the two-dimensional noise field. The theoretical conclusions are used for numerical examples. Analysis of the investigation results is performed.

***Invited Contribution*: THE LANGUAGE OF ARGUMENTATION**

H. Hovhannisian **113**