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ADAPTIVE 0FDM IMPLEMENTATION USING FUZZY INTERFACE SYSTEM

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Abstract:

As the demand of high quality systems of next generation wireless communication systems increases, a high performance of data transmission requires an increase of spectrum efficiency and an improvement of error performance in wireless communication systems. One of the promising approaches to 4G is adoptive OFDM, adoptive communication is one of key technology's used to enhance the capabilities in future of communication systems. In AOFDM, adoptive transmission scheme is employed according to the channel fading conditions with OFDM to improve the performance. Adoptive modulation system using hardware decision making circuits are insufficient to decide or change the modulation scheme according to given conditions. Using fuzzy logic in decision making interface makes the system more efficient. Fuzzy interface is the process of formulating the mapping from a given input to an output using fuzzy logic. The proposed system is a new scheme to adopt modulation technique using fuzzy rule based system to achievable data rate with maintaining the good error performance in OFDM system.

Introduction

Orthogonal frequency division multiplexing is a multicarrier transmission technique which divides the available spectrum many Carriers each one being modulated by a low rate data stream OFDM is a combination of modulation and multiplexing and is a special case of is Frequency division multiplexing. OFDM eliminates ISI and IFI use of a cyclic prefix good production against the co-channel interference and impulsive parasitic noise OFDM is less sensitive to the sample timing of set them single carrier system OFDM system with adaptive modulation using Fuzzy Logic interface improve the system.

Adaptive modulation system using the ordinary hardware addiction making circuits are inefficient to decide or change the modulation scheme according to the given condition using Fuzzy Logic decision making interface makes the system more efficient results of the computer simulation show the improvement of the system capacity in Rayleigh fading channel. A fuzzy inference is the process of mapping from a given input to an output using fuzzy logic. The

process involves membership functions, fuzzy logic operators, and if-then rules. A fuzzy inference system uses fuzzy set theory to map inputs to outputs.

Proposed Work

In AOFDM, Adaptive transmission scheme is employed according to channel fading condition with OFDM to improve performance. Adaptive modulation scheme is superior to fixed modulation system since it changes modulation scheme according to channel to adaptive modulation using hardware decision making circuits are inefficient to decide or change modulation scheme according to given conditions. Using fuzzy logic in decision making interface makes the system more efficient.

The Adaptive OFDM System comprises three sections.

1. Transmitter section
2. Channel
3. Receiver section

Block Diagram

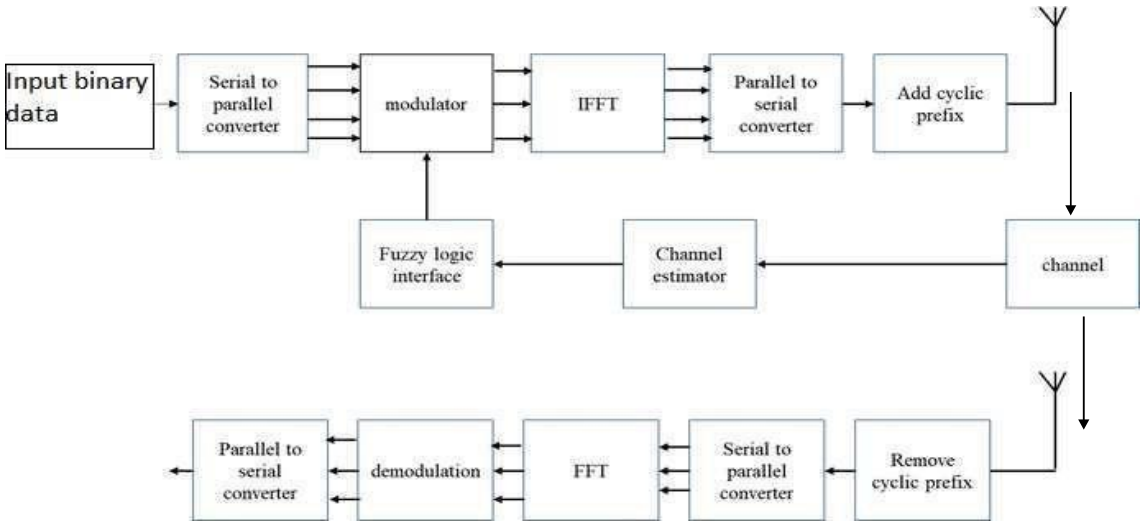


Fig: Adaptive OFDM Block Diagram

Transmitter Section

An OFDM Transmitter converts serial data to parallel, modulates it, converts it to time domainand transmits to serial data.

Serial To Parallel Conversion

The data is then transmitted in parallel by assigning each data word to one carrier in thetransmission.

Modulator

Modulation is a process of facilitating the transfer of information over a medium.

IFFT

IFFT block is used to change domain of the signal from frequency to time.

Adding cyclic prefix

Addition of cyclic prefix mitigates the effects of fading, inter symbol interference and increasesbandwidth.

Channel

The model allows for the signal to noise ratio, multipath, and peak power clipping to be controlled.

Channel Estimation

Channel estimation allows to-determine the distortion. Further more it is possible to remove thedistortion by multiplying received signal by inverse of RF channel transfer function.

Receiver Section

The receiver basically does the reverse operation to the transmitter. The FFT of each symbol isthen taken to find the original transmitted spectrum.

Removing cyclic prefix

Cyclic prefix added in the transmitter is removed to get perfect periodic signal.

FFT

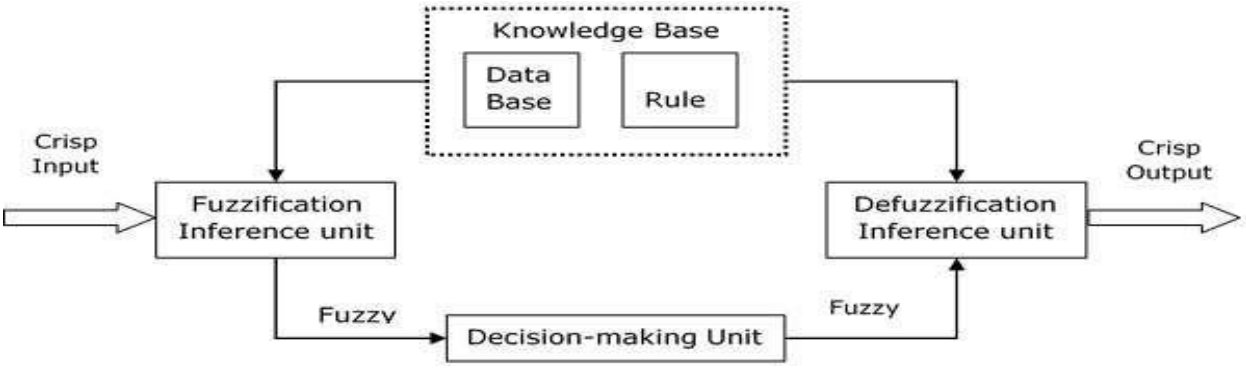
It is used to change domain of the signal from time to frequency.

Demodulator

A demodulator performs reverse process of modulator which returns information.

Fuzzy Interface System

A fuzzy interface is the process of mapping from a given input to an output using fuzzy logic. The process involves membership functions, fuzzy logic operators and if-then rules. A FIS uses fuzzy set theory to map inputs to outputs.



Rule Base

It contains fuzzy rules.

Data Base

It defines the membership functions of fuzzy sets used in fuzzy rules.

Decision-making Unit

It performs operation on rules.

Fuzzification Interface Unit

It converts the crisp quantities into fuzzy quantities.

Defuzzification Interface Unit

It converts the fuzzy quantities into crisp quantities.

Results

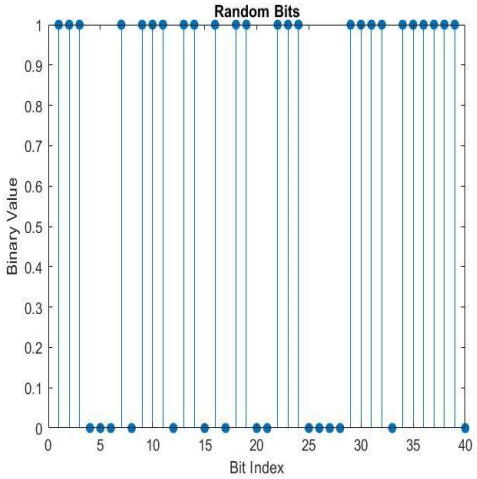


Fig: Random Bits

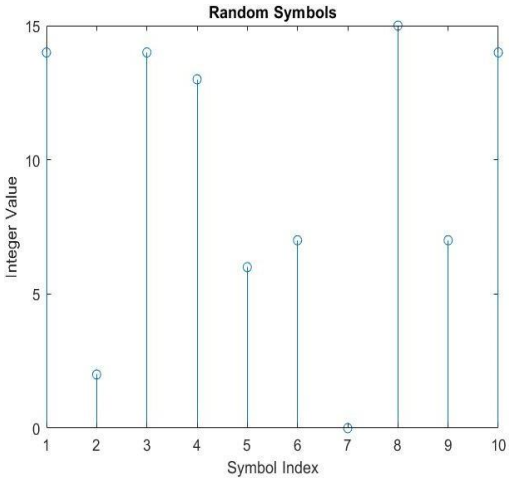


Fig : Random Symbols

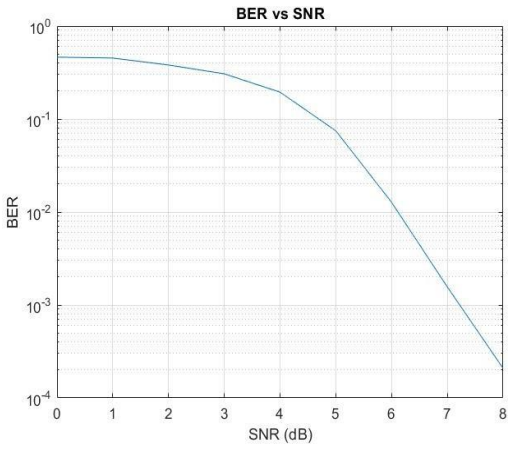


Fig: BER vs SNR

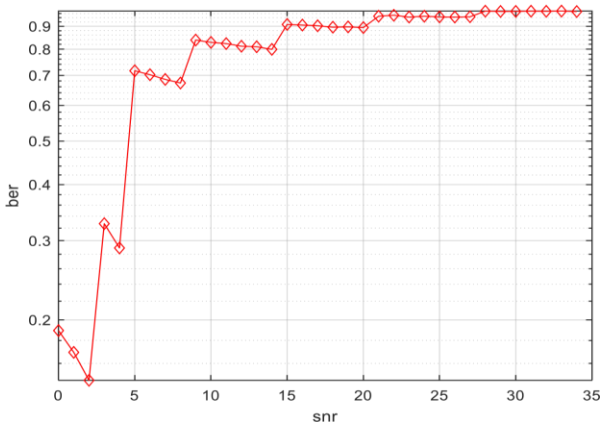


Fig : Adaptive OFDM BER vs SNR

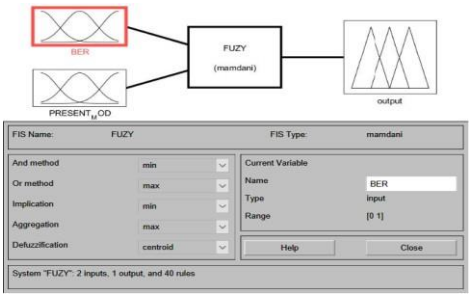


Fig : Fuzzy Interface System

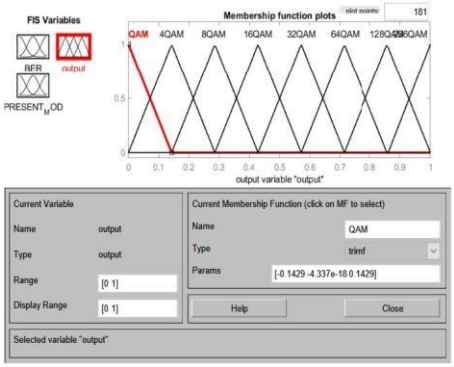


Fig : Membership Functions

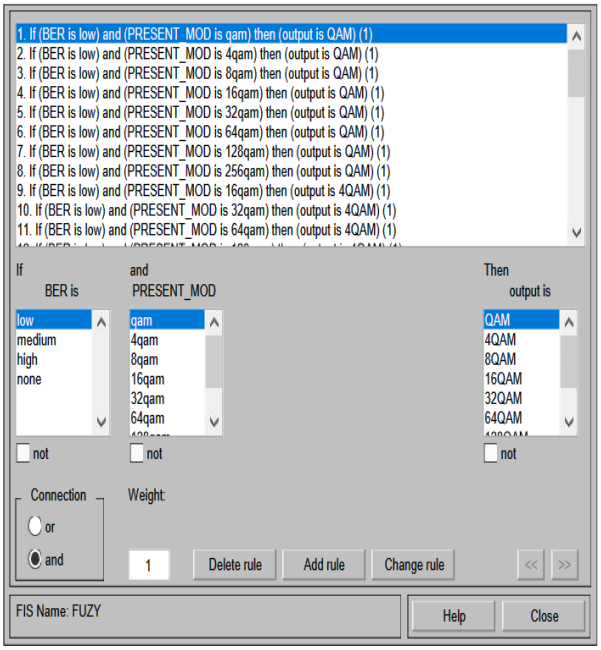


Fig : Rule Base

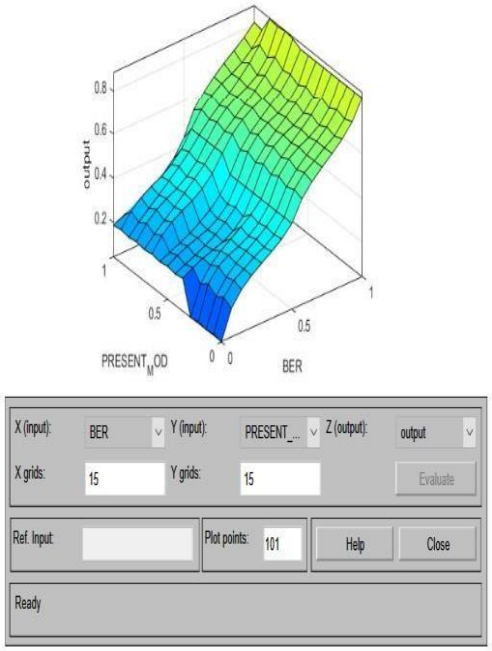


Fig : Surface Output

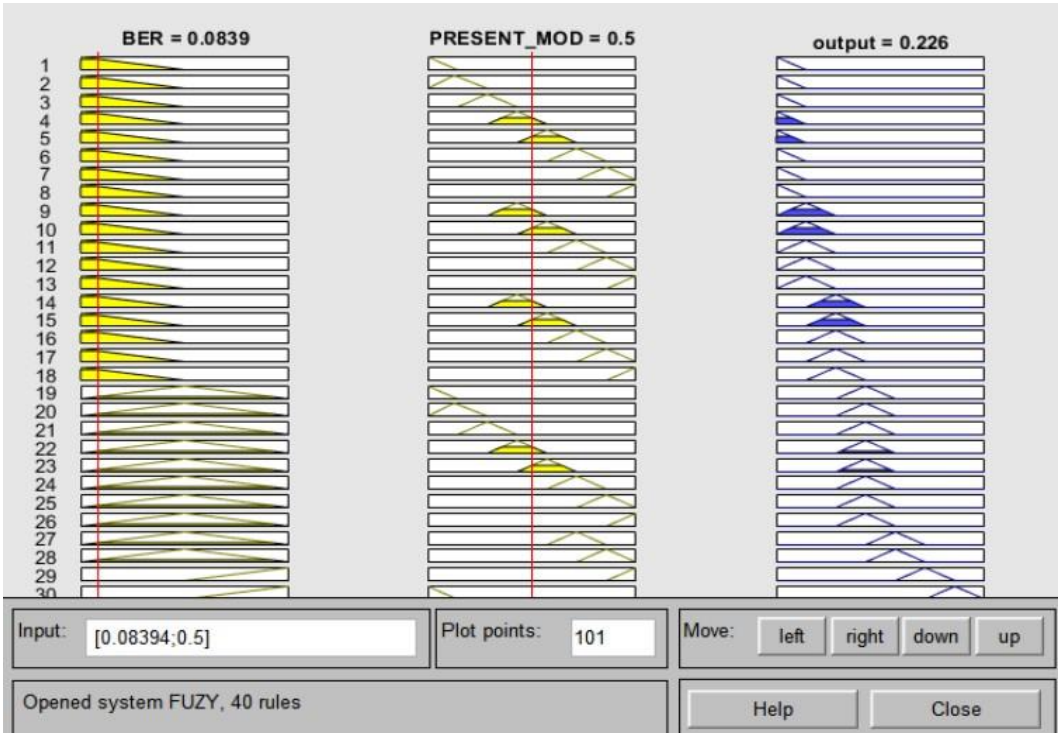


Fig: Rule Output

Applications

1. Automatic control system.
2. Prediction, diagnostic and advisory systems.
3. User interface and neural language processing.
4. Domestic appliances and embedded systems.
5. Soft computing and hybrid systems with artificial.
6. Neural networks.
7. Fuzzy expert system and fuzzy inference.

Conclusion

Adaptive modulation is a powerful technique for maximizing the data throughput of a subcarrier allocated to the user. Adaptive modulation involves the measuring of the snr of each subcarrier in the transmitter then selecting the modulation scheme that will maximize the spectral efficiency. while maintaining an acceptable BER the fuzzy logic based adaptive modulation performs better than ordinary logic-based and approve FDM systems. Fuzzy logic

system is a technique which helps to make your FIS system and have to win nature so it can choose the better modulation in order with code rate according to the value of snr and beer and enhance the performance of OFDM system in terms of fast and error free data.

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