Guna sai kiran
BT20ECE075
LAB-03

I. Aim:

Convolutional Encoding Using Matlab.

II. Software Required:

Matlab;

III. Theory:

The main aim of a digital communication system is to transmit information reliably over a channel. The available amount of transmitter power and bandwidth are the major constraints in the design of a digital communication system. The channel can be coaxial cables, microwave links, or fiber optic. The channel is subject to various types of noise, distortion, and interference. Also some communication systems have limitation on transmitter power. All these may lead to errors. Consequently we may need some form of error control encoding to recover the information reliably. Convolutional codes are extensively used for real time error correction. The position of the channel encoder is shown in following block diagram of the elements of a digital communication system.

Error-control coding can be used for a number of different applications. Codes can be used to achieve reliable communication in presence of interference. In military applications error control codes are used to protect information from intentional enemy interference. In case of satellite communication, there are severe limitations on transmitter power. So with the help of error control coding we can correctly recover very weak messages. Even when the received signal power is close to thermal noise power, error control coding is used to achieve reliable communication. The deep-space communications application has been the arena in which most of the most powerful coding schemes for the power-limited AWGN channel have been first deployed, because the only noise is AWGN in the receiver front end; bandwidth is effectively unlimited; power fractions have huge scientific and economic value; and receiver (decoding) complexity is effectively unlimited.

Digital autopilots, digital process-control systems, digital switching systems, and digital radar signal processing all are systems that involve large amounts of digital data transfers between interconnected subsystems. In all these cases, error control coding is essential to maintain proper performance.

There are many different types of error control codes like BCH codes, Reed Solomon codes, Linear Block codes, Turbo codes, Convolutional codes. Different factors affect the choice of a particular coding scheme. Constraints like cost, power, bandwidth, type of channel, allowable Delay in Decoding, data rate and type of information play a major role in selection of a particular coding scheme. However, Reed Solomon codes, Turbo codes, and Viterbi decoded Convolutional codes are more frequently used with respect to other error control.

IV. Steps:

The convolutional encoder with rate (k/n) = 1/3, and constrain length K=3

This is a rate (k/n) = 1/3, with constrain length K=3 convolutional encoder. Here k is the number of parallel input information bits and n is the number of parallel output encoded bits at one time interval.

The constraint length, K, of the convolutional encoder is defined by K=M+1, where M is the maximum number of memories in any shift register. Generally convolution codes are described by their generator polynomials, for this example they are:
g1(D):D2
g2(D):D2+l
g3(D):D2 + D+l
Other useful methods used for their description are the state transition diagram and Trellis structure

V. Inbuilt Functions:

1) codedout = **convenc(msg,trellis)** encodes the input binary message by using a convolutional encoder represented by a trellis structure. For details about trellis structures in MATLAB®, see Trellis Description of a Convolutional Code. The input message contains one or more symbols, each of which consists of log2(trellis.numInputSymbols) bits. The coded output, codedout, contains one or more symbols, each of which consists of log2(trellis.numOutputSymbols) bits.

VI. Conclusion:

We have successfully Encoded And Decoded Using Convolutional Encoding Method Using Matlab.