The Simulation of DSB and SSB and Contrastive Analysis for their Performances

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Abstract: Two analog communication systems, DSB and SSB, are widely used in broadcast communication and radio communication. DSB and SSB are designed and realized simulation in System View that is the software for the simulation of communication system. The performances of this two communication systems are contrastive analysed to be better applied to communication systems with different requirements.

1. Introduction

With the rapid development of modern technology, communication technology [1] becomes more comprehensive and intelligent in order to achieve different communication purposes. Communication systems include analog communication systems, digital baseband communication systems and digital bandpass communication systems[2].Analog communication systems are widely used in AM broadcast communication, stereo broadcast communication and short wave radio communication, and so on. DSB and SSB are two important communication systems in analog communication system. DSB and SSB are designed and realized simulation in SystemView[3] and the performance of this two analog communication systems is contrastive analysed.

2. Design and Simulation of DSB and SSB

Firstly, the model of analog communication system is introduced. Secondly, the DSB is designed and simulated. Thirdly, the DSB is conceived and realized too. Lastly, the performance of DSB and SSB is analysed.

2.1 Analog Communication System

The analog communication system realizes the transmission of the analog signal. The information source [4] is modulated. Modulated signal [5] mixed with noise is sent to channel. Then modulated signal and noise are demodulated and transmitted to the information destination. The model of analog communication system is shown in Fig. 1.

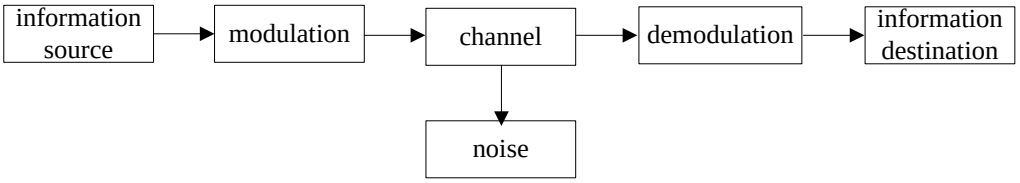

Fig. 1 The model of analog communication system

2.2 Design and Simulation of DSB

The design and simulation of DSB introduces the block diagram of modulation and demodulation [6] for DSB and the simulation waveform of DSB that is implemented in SystemView.

2.2.1 The block diagram of modulation and demodulation for DSB

According to the principle of DSB modulation and demodulation, the block diagram of modulation and demodulation for DSB is designed. The block diagram of modulation and demodulation for DSB is shown in Fig. 2.

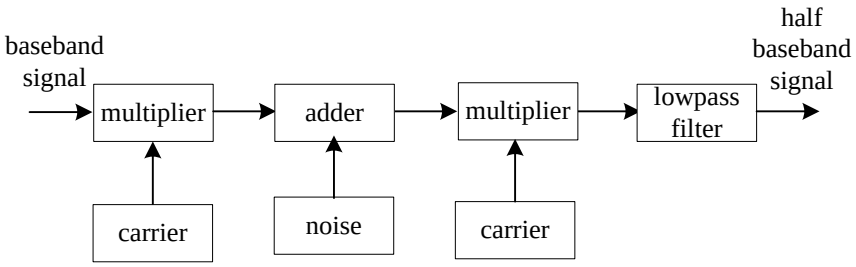

Fig. 2 The block diagram of modulation and demodulation for DSB

The baseband signal is multiplied by carrier, which is called modulated signal. The modulated signal is disturbed by noise in channel. The modulated signal mixed with noise is multiplied by the synchronous carrier. And the output, half baseband signal, is finally obtained by lowpass filter.

2.2.2 The simulation of DSB

In the SystemView, according to the block diagram of modulation and demodulation for DSB, the simulation circuit of DSB is designed and completed that is omitted. The simulation waveform of DSB is shown in Fig. 3. It is found that in DSB communication system the baseband signal, Sink18, can be recovered well from the demodulated signal, Sink21.

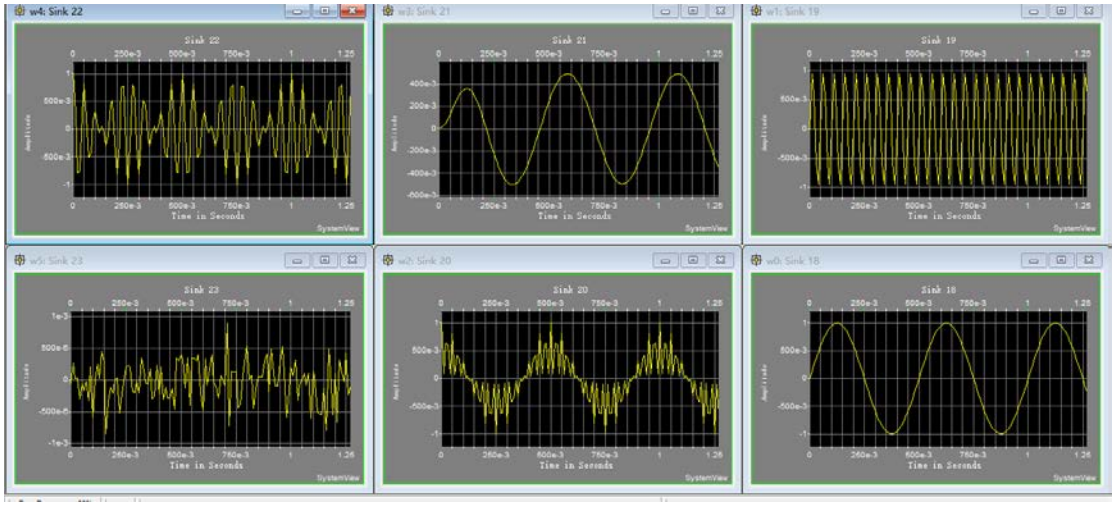

Fig. 3 The simulation waveform of DSB

2.3 Design and Simulation of SSB

The Design and Simulation of SSB also involves The block diagram of modulation and demodulation for SSB and the simulation of SSB

2.3.1 The block diagram of modulation and demodulation for SSB

After careful analysis, it is found that the spectrum of the upper or lower band of DSB contains all the spectrum of the baseband signal. Therefore, if we reserve the upper band or the lower band of DSB, the baseband signal can be recovered. This method is called SSB. It is designed to retain the spectrum of the lower band of DSB and the mathematical processes are not presented. The block diagram of modulation and demodulation for SSB is shown in Fig. 4.

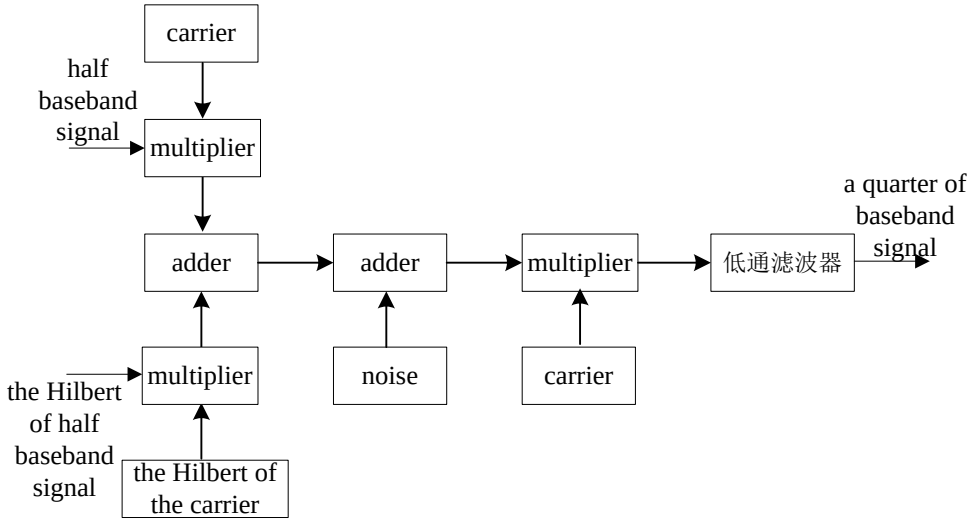

Fig. 4 The block diagram of modulation and demodulation for SSB

2.3.2 The simulation of SSB

According to the block diagram of modulation and demodulation for SSB, the simulation circuit of SSB is devised in software. The simulation circuit of SSB is left out. It is shown that demodulated signal, Sink22, can recover baseband signal, Sink8, well. The simulation waveform of SSB is shown in Fig. 5.

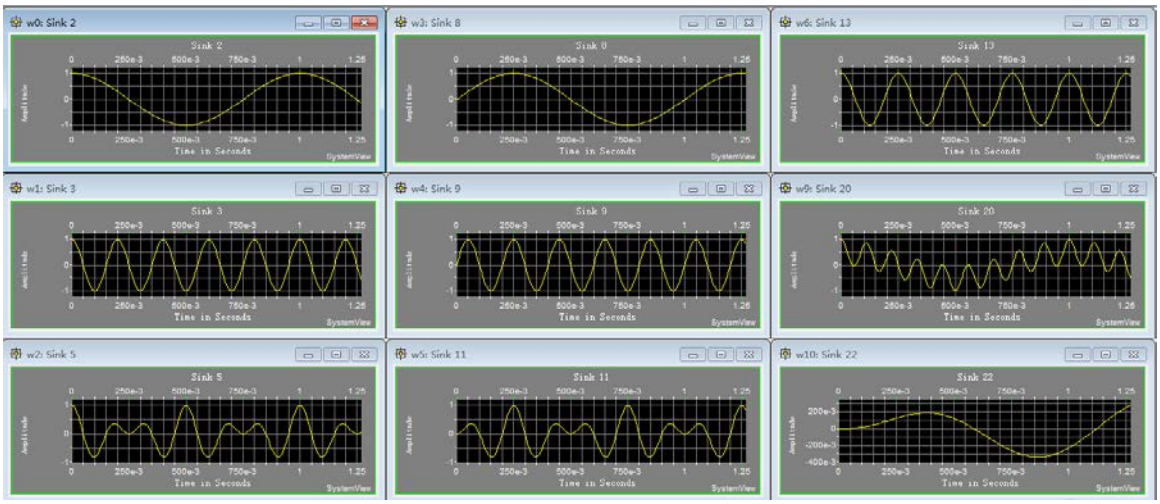

Fig. 5 The simulation waveform of SSB

3. Contrastive Analysis of the Performances of DSB and SSB

The smaller the bandwidth of the modulated signal, the higher the spectrum efficiency and the higher the efficiency of the communication system. In the case of error free transmission, the greater the noise, the stronger the interference rejection capacity and the higher the reliability of the communication system. Contrastive Analysis for the Performances of DSB and SSB is shown in Table 1.

Table 1 Contrastive analysis for the performances of DSB and SSB

Index / Communication system	Equipment of communication system	Ratio of modulated signal bandwidth to baseband bandwidth	Noise	Performance index	
				Efficiency	Reliability
DSB	simple	2	much	low	high
SSB	complex	1	little	high	low

4. Conclusion

DSB and SSB that are two analog communication systems are widely used in broadcast communication and radio communication. DSB and SSB are designed, simulated and compared. It is concluded that DSB has low efficiency, high reliability and simple communication equipment and SSB has high efficiency, low reliability and complex communication equipment. Depending on their respective characteristics, DSB and SSB can be better used in different communication systems with different requirements.

Acknowledgments

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