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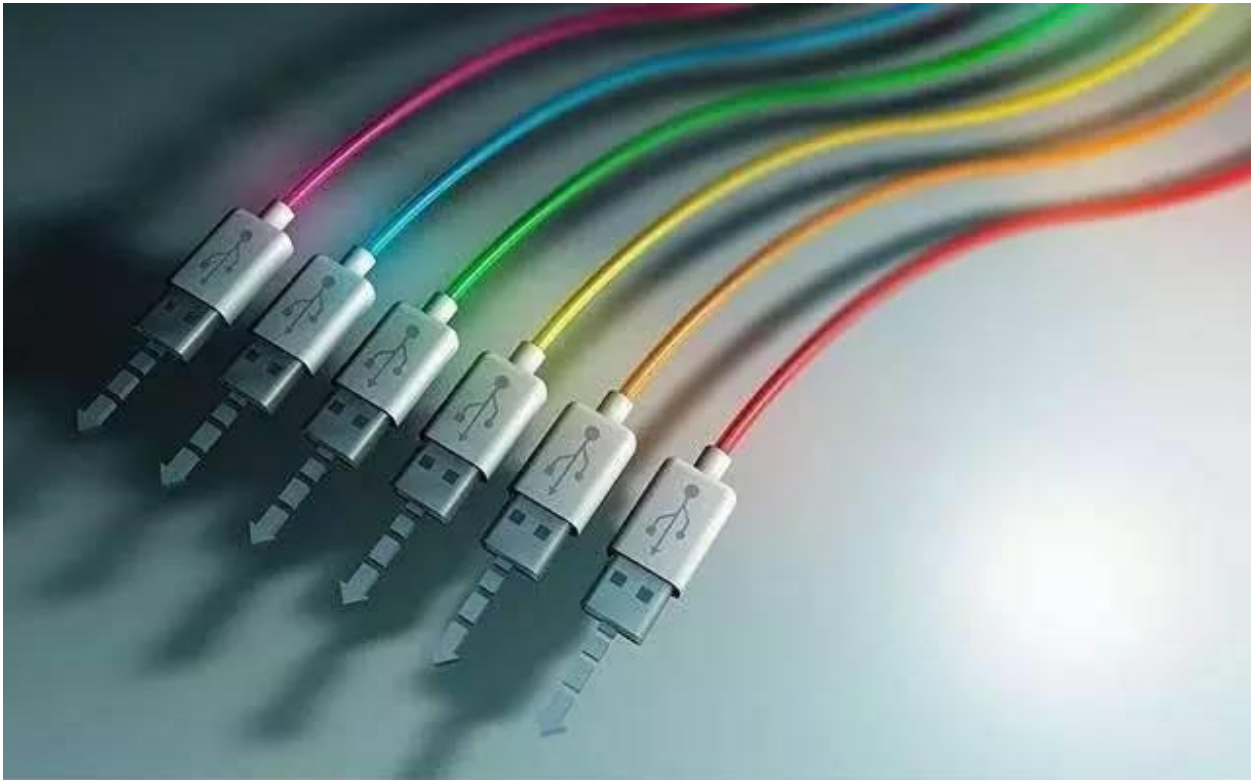
17/ENG06/002

MECHANICAL ENGR

ENG 342 CLASS WORK

Communications Industry

In order to meet the operational needs of large-scale data center equipment rooms, the UPS usage capacity in the communication power distribution system has increased significantly. According to the survey, the main harmonic source equipment of the communication low-voltage power distribution system is UPS, switching power supply, inverter air conditioner and so on.



The harmonic content generated is high, and the displacement power factor of these harmonic source devices is extremely high. By using active filters, the stability of communication systems and power distribution systems can be improved, the service life of communication equipment and power equipment can be extended, and the power distribution system can be more in line with the design specifications of harmonic environments.

Semiconductor Industry

The triple harmonics of most semiconductor industries is very serious, mainly due to the large number of single-phase rectifiers used in the enterprise. The triple harmonics belongs to the zero-order harmonic, which has the characteristics of collecting in the neutral line, causing the neutral line pressure to be too large, and even sparking phenomenon, which has great production safety hazards.



Triple harmonics can also cause the circuit breaker to trip, delaying production time. The triple harmonics forms a circulation in the transformer, which accelerates the aging of the transformer. Severe harmonic pollution will inevitably affect the efficiency and longevity of equipment in power distribution systems.

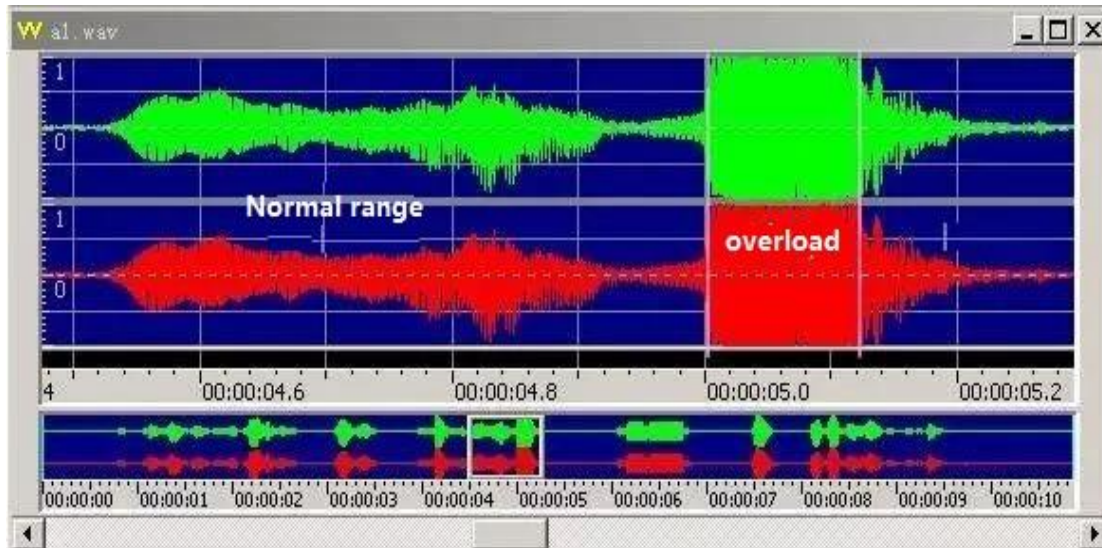
DC Motor Harmonic Control

Large DC motor places need to convert AC power to DC power through rectification equipment. Because of the large load capacity of such projects, there are serious harmonic pollution on the AC side, causing voltage distortion and causing accidents in severe cases.

The use of automated production lines and precision equipment.

In the case of automated production lines and precision equipment, harmonics can affect their normal use, causing faults in intelligent control systems, PLC systems, etc.

Speech Signal Processing



Speech processing is one of the earliest fields of application of digital filters, and one of the first areas to promote the development of digital signal processing theory. The field mainly includes five aspects:

First, speech signal analysis. That is, the waveform characteristics, statistical characteristics, model parameters, etc. of the speech signal are analyzed and calculated;

Second, speech synthesis. That is, using dedicated digital hardware or running software on a general purpose computer to generate speech;

Third, speech recognition. That is, using dedicated hardware or a computer to recognize the words spoken by the person, or to identify the person speaking;

Fourth, voice enhancement. That is, the masked speech signal is extracted from noise or interference.

Fifth, speech coding. Mainly used for voice data compression, a series of international standards for speech coding have been established, which are widely used for communication and audio processing.

TV, Radar



The replacement of analog TV by digital TV is an inevitable trend. The popularity of high-definition television is just around the corner, and the accompanying video disc technology has formed an industry with a huge market; videophones and conference TV products are constantly being updated.

The achievements and standardization of video compression and audio compression technologies have led to the booming industry in the TV industry, and digital filters and related technologies are important foundations for video compression and audio compression technologies.

The radar signal occupies a very wide frequency band and the data transmission rate is also very high. Therefore, compressing the data volume and reducing the data transmission rate are the primary problems faced by the digital processing of the radar signal. Telling the emergence of digital devices has spurred advances in radar signal processing technology.

In modern radar systems, the digital signal processing part is indispensable because digital signal filtering technology is indispensable from signal generation, filtering, processing, estimation of target parameters and target imaging display. Digital filters for radar signals are one of the most active research areas today. Sonar signal processing is divided into two categories, active sonar signal processing and passive sonar signal processing. Many of the theories and techniques involved in active sonar systems are the same as radar system.

B.

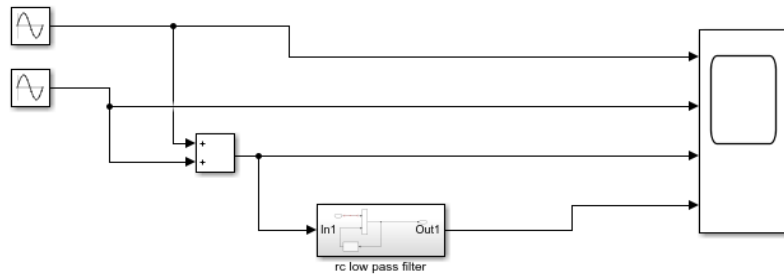
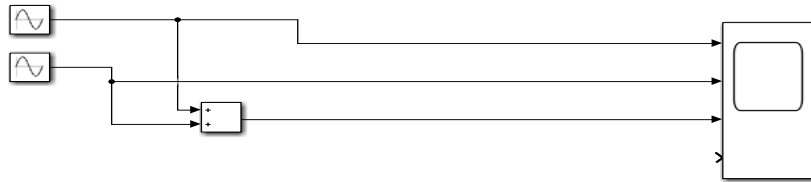


Figure 1: low pass filter design

C.

Cut off frequency

$$F_c = \frac{1}{2\pi R C}$$

$$R = 0.005 \text{ ohms}$$

$$C = 0.01 \text{ F}$$

$$F_c = \frac{1}{2\pi \cdot 0.005 \cdot 0.01}$$

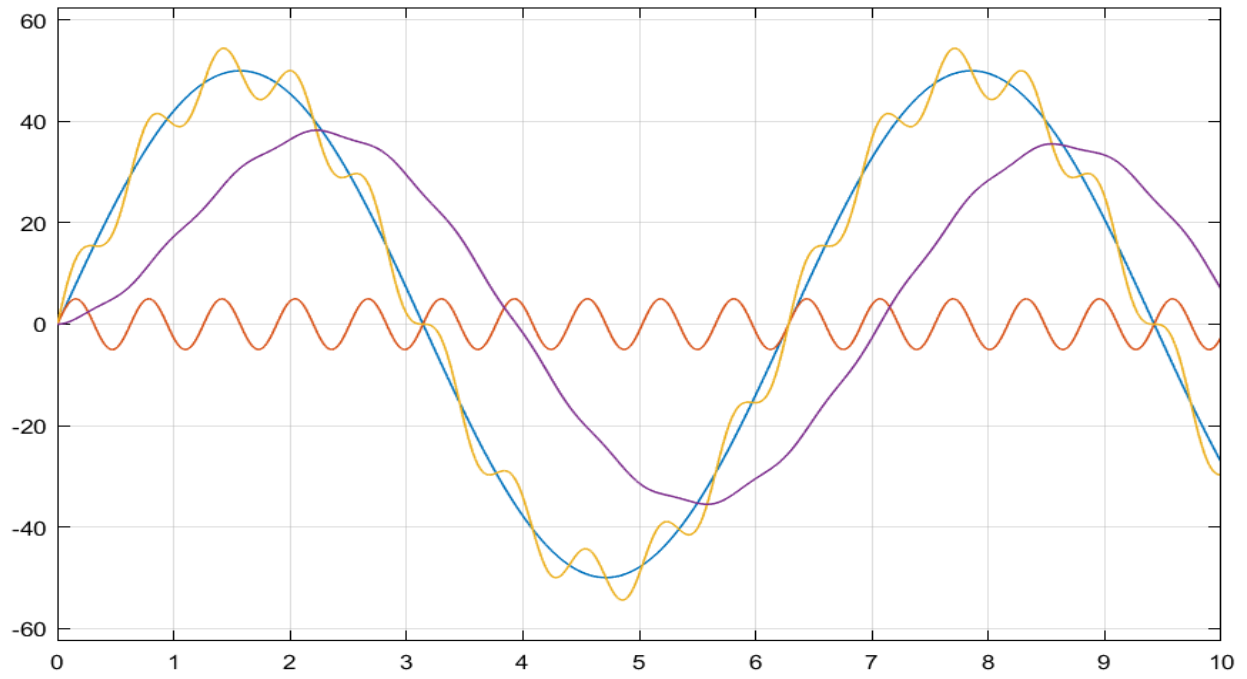
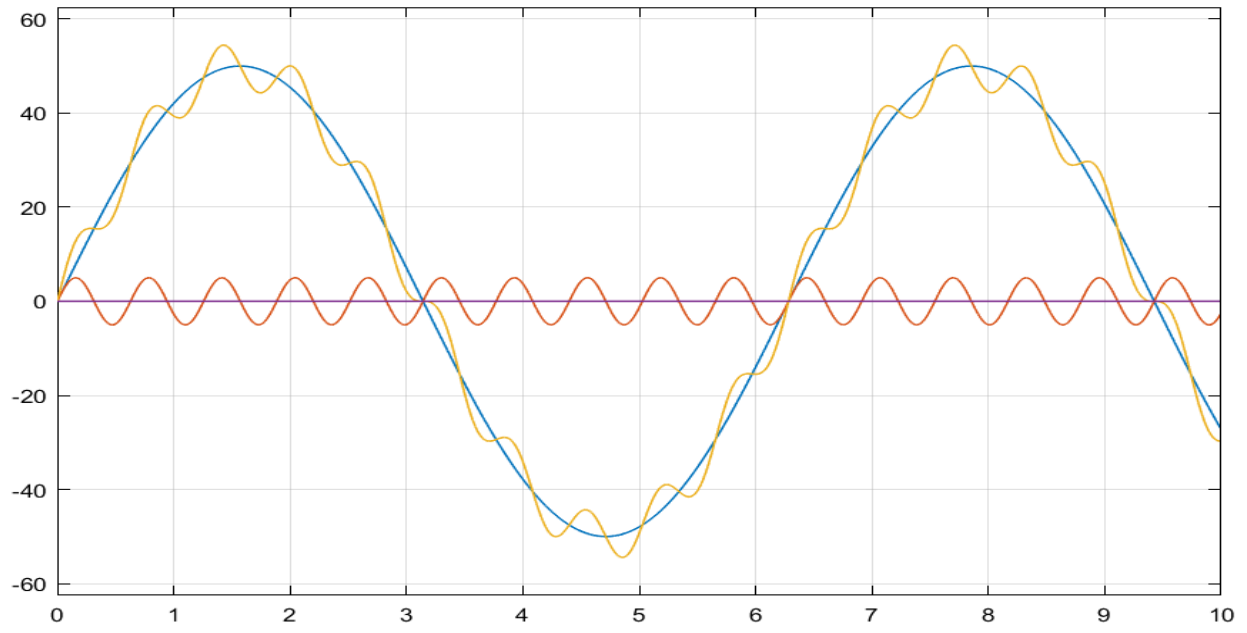
$$F_c = 3183.098 \text{ Hz}$$

D.

amplitude-50

Step size – 0.00005

E.



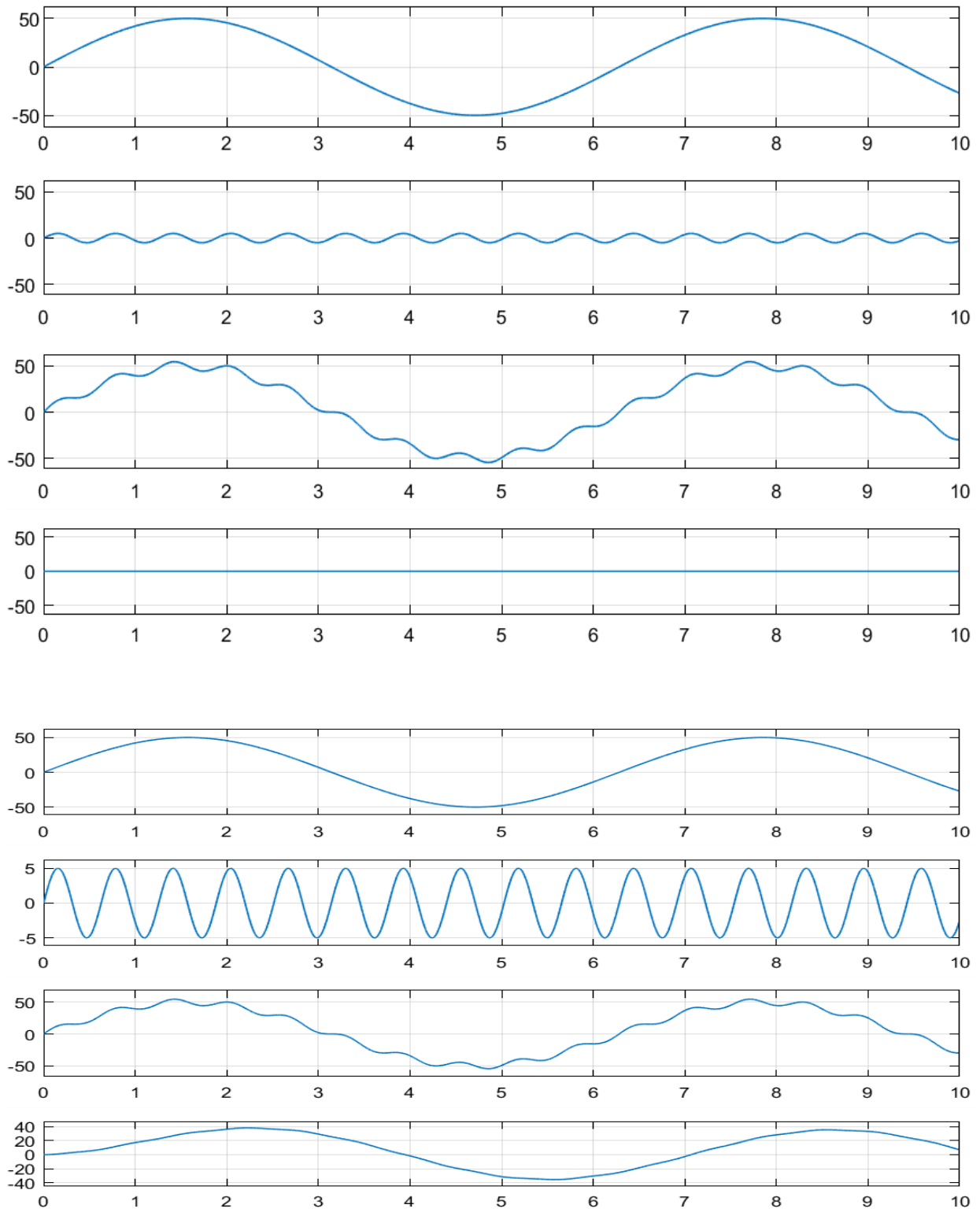


Figure 2: output

