

# EXPERIMENT – 1 CODES

## AMPLITUDE MODULATION AND DEMODULATION

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### DSBFC (Double Sideband Full Carrier) Modulation and Demodulation Code:

```
Fs = 10000;
t = -0.1:1/Fs:0.1;
fc = 1000;
fm = 100;
Ac = 1;
Am = 0.5;

message = Am * sin(2 * pi * fm * t);
carrier = Ac * cos(2 * pi * fc * t);
dsbfc = Ac * (1 + message) .* cos(2 * pi * fc * t);

dsbfc_envelope = abs(hilbert(dsbfc));
demodulated_dsbfc = dsbfc_envelope - Ac;

figure;
subplot(3, 1, 1);
plot(t, message);
title('Message Signal');
xlabel('Time (s)');
ylabel('Amplitude');
grid on;

subplot(3, 1, 2);
plot(t, dsbfc);
title('DSBFC Signal (Under Modulated)');
xlabel('Time (s)');
ylabel('Amplitude');
grid on;

subplot(3, 1, 3);
plot(t, demodulated_dsbfc);
title('Demodulated Signal (Under Modulated)');
xlabel('Time (s)');
ylabel('Amplitude');
grid on;

N = length(dsbfc);
f = (0:N-1) * (Fs / N);
Y = abs(fft(dsbfc));
```

```

figure;
plot(f, Y);
title('Frequency Domain of DSBFC Signal');
xlabel('Frequency (Hz)');
ylabel('Magnitude');
grid on;

```

## DSBSC (Double Sideband Suppressed Carrier) Modulation and Demodulation Code:

```

Fs = 10000;
t = -0.1:1/Fs:0.1;
fc = 1000;
fm = 100;
Ac = 1;
Am = 0.5;

message = Am * sin(2 * pi * fm * t);
carrier = Ac * cos(2 * pi * fc * t);
dsbsc = Ac * message .* cos(2 * pi * fc * t);

demodulated_dsbsc = dsbsc .* (2 * cos(2 * pi * fc * t));
[b, a] = butter(6, 2 * fm / Fs);
demodulated_dsbsc_filtered = filter(b, a, demodulated_dsbsc);

figure;
subplot(3, 1, 1);
plot(t, message);
title('Message Signal');
xlabel('Time (s)');
ylabel('Amplitude');

grid on;

subplot(3, 1, 2);
plot(t, dsbsc);
title('DSBSC Signal');
xlabel('Time (s)');
ylabel('Amplitude');
grid on;

subplot(3, 1, 3);
plot(t, demodulated_dsbsc_filtered);
title('Demodulated Signal');
xlabel('Time (s)');
ylabel('Amplitude');
grid on;

N = length(dsbsc);
f = (0:N-1) * (Fs / N);
Y = abs(fft(dsbsc));

```

```
figure;  
plot(f, Y);  
title('Frequency Domain of DSBSC Signal');  
xlabel('Frequency (Hz)');  
ylabel('Magnitude');  
grid on;
```