pulse-amplitude-modulation

March 29, 2024

[11]:
```
import numpy as np
import matplotlib.pyplot as plt
```

[70]:
```
fc = 50
fm = 2
fs = 1000
t = 1
duty  = 20
n = np.arange(0, t, 1/fs)
```

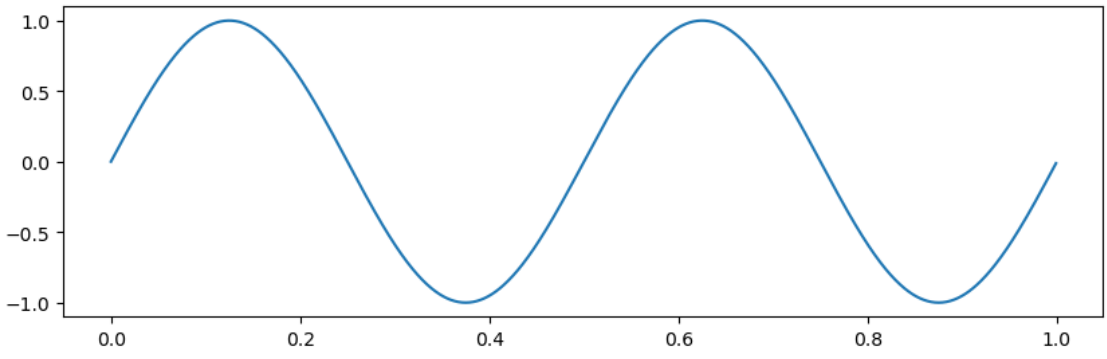
[71]:
```
s = np.sin(2 * np.pi * fc * n)
s[s < 0] = 0
```

[ ]:
```

```

[82]:
```
m = np.sin(2 * np.pi * fm * (n - 1))
plt.figure(figsize=(10, 3))
plt.plot(n, m)
```

[82]:
```
[<matplotlib.lines.Line2D at 0x26ae4bd1dd0>]
```



[83]:
```
period_sample = len(n) / fc
period_sample
```

[83]:
```
20.0
```

[84]:
```
index = np.arange(0, len(n), int(period_sample))
index
```

[84]:
```
array([  0,  20,  40,  60,  80, 100, 120, 140, 160, 180, 200, 220, 240,
       260, 280, 300, 320, 340, 360, 380, 400, 420, 440, 460, 480, 500,
       520, 540, 560, 580, 600, 620, 640, 660, 680, 700, 720, 740, 760,
       780, 800, 820, 840, 860, 880, 900, 920, 940, 960, 980])
```

[85]:
```
on_sample = int(np.ceil(period_sample * duty / 100))
on_sample
```

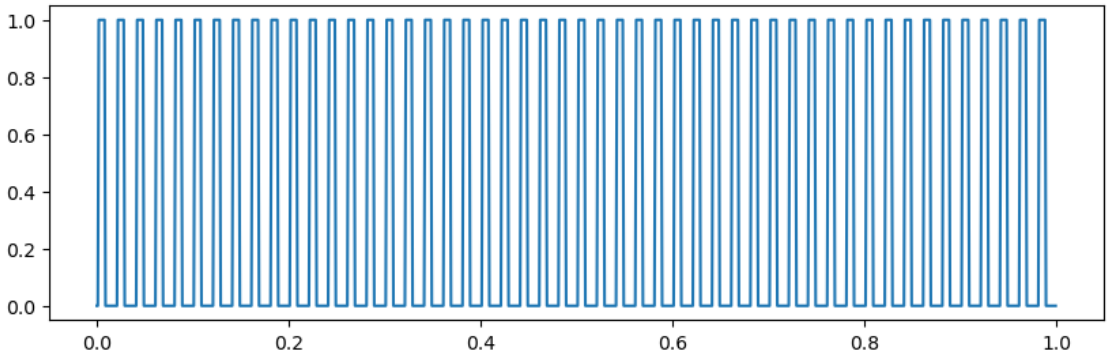
[85]:
```
4
```

[86]:
```
pam = np.zeros_like(n)
```

[87]:
```
carrier_pulse_train = np.where(s > 0.35, 1, 0)
```

[88]:
```
plt.figure(figsize=(10, 3))
plt.plot(n, carrier_pulse_train[: len(n)])
```

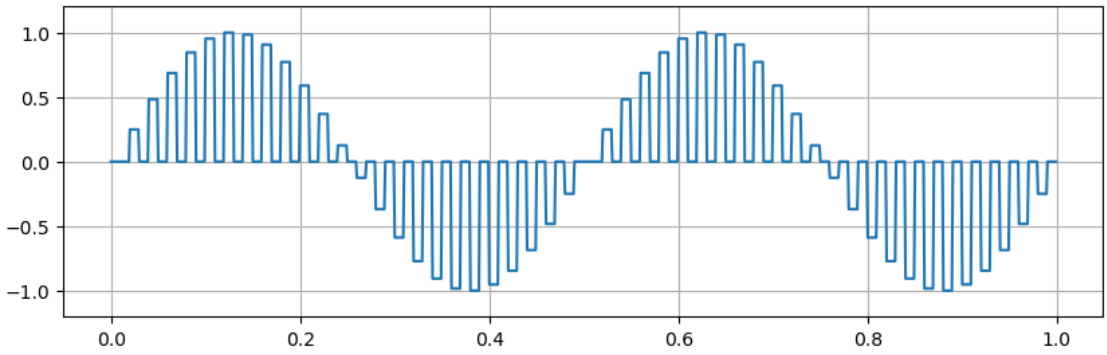
[88]:
```
[<matplotlib.lines.Line2D at 0x26ae4c5a390>]
```



[89]:
```
for i in range(len(index)):
    pam[index[i] : index[i] + on_samp] = m[index[i]]
```

[90]:
```
plt.figure(figsize=(10, 3))
plt.plot(n, pam)
plt.grid(True)
plt.ylim([-1.2, 1.2])
```

[90]:
```
(-1.2, 1.2)
```


1.0
0.5
0.0
−0.5
−1.0
0.0
0.2
0.4
0.6
0.8
1.0

[ ]: