

Blatt 03 - Amplitude

Kreatives Programmieren 1

Luís Antunes Pena

Oktober 2024

Contents

1	Literatur	1
2	Amplitude	1
2.1	Envelopes (Hüllkurve)	2
2.2	Hüllkurve und Klangfarbe	4
2.3	Beating / Schwebung	4
2.4	Amplitude im Kontext digitaler Signale	5

1 Literatur

- Miller Puckett: The Theory and Technique of Electronic Music
- Richard Boulanger [Editor]: The Csound Book
- Charles Dodge, Thomas A. Jerse: Computer Music

2 Amplitude

2.1 Envelopes (Hüllkurve)

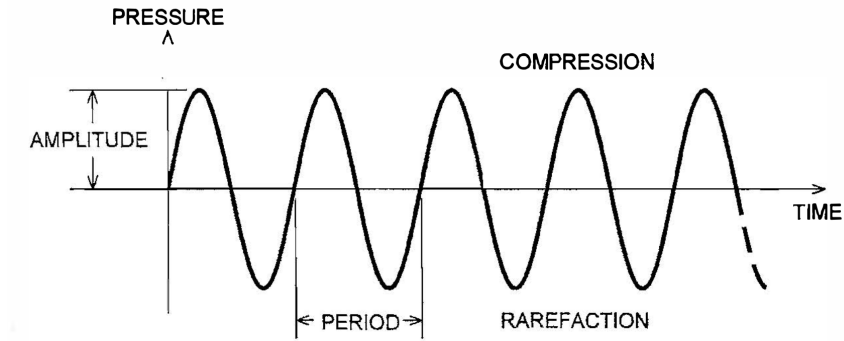


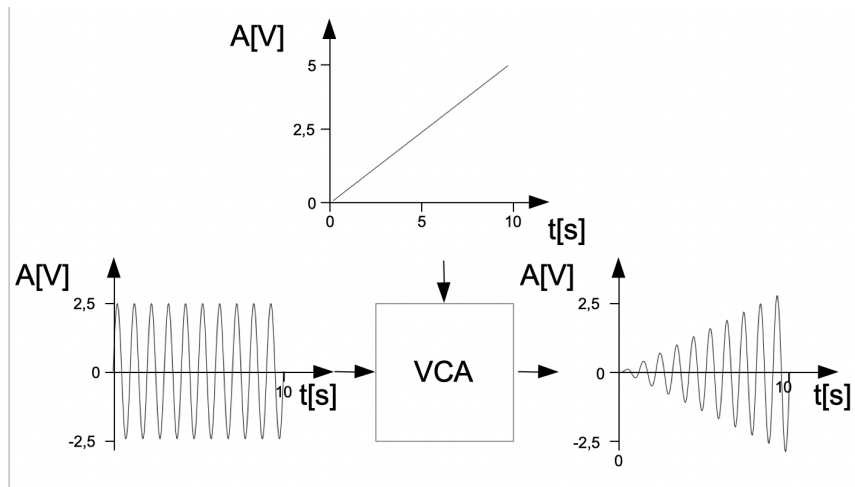
FIGURE 2.1 Periodic waveform.

T - Periode [Sekunden]

f - Frequenz [Hertz]

A - Amplitude $[\text{N}/\text{m}^2]^1$ [0-1] [dB]

$$f = \frac{1}{T}$$



¹Newton per Quadratmeter

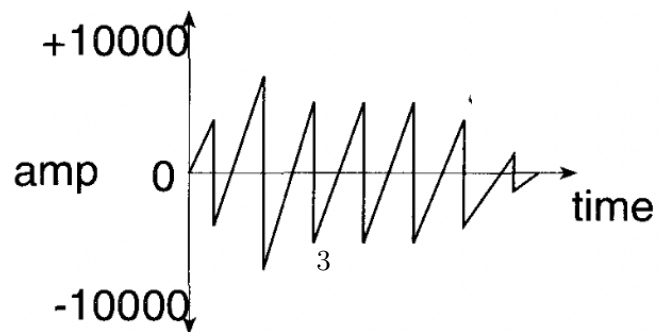
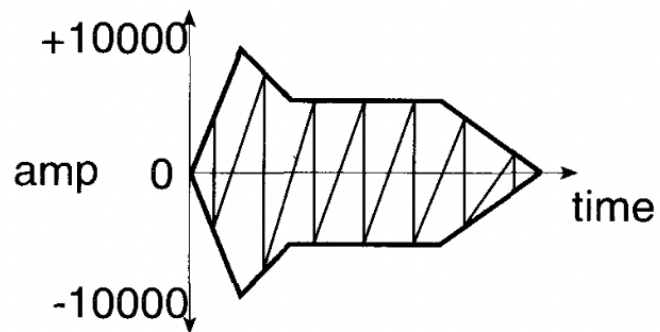
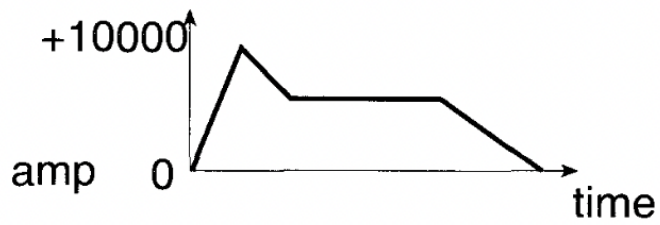
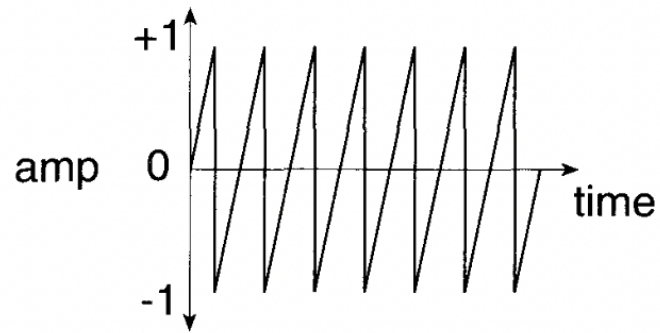


Figure 1.26 “Enveloping” a signal.

2.2 Hüllkurve und Klangfarbe

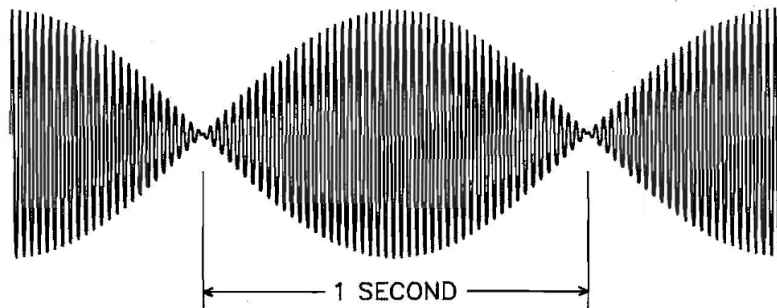
- Pierre Schaeffer: Solfège de l'objet sonore, 1967: Le Enigme du Timbre
<https://youtu.be/0ZDRlpAr6Hs?si=2e2hq20fH-VURia9&t=15>

2.3 Beating / Schwebung

$$F_1 = 49Hz \quad F_2 = 50Hz^2$$

$$F_{Summe} = F_1 + F_2$$

$$Schwebung = F_2 - F_1 = 1Hz$$



MaxMSP: 03_Pitch_Schwebung.maxpat

²In Cent: 35 Cents d.h. $49Hz + 35Cent = 50Hz$

2.4 Amplitude im Kontext digitaler Signale

MSB	—	—	—	—	LSB
6	5	4	3	2	1
					0
					1
				1	0
				1	1
			1	0	0
			1	0	1
			1	1	0
			1	1	1
		1	0	0	0
		1	0	0	1
		1	0	1	0
		1	0	1	1
		1	1	0	0
		1	1	0	1
		1	1	1	0
		1	1	1	1
	1	0	0	0	0
	1	0	0	0	1
	1	0	0	1	0
	1	0	0	1	1
	1	0	1	0	0
	1	0	1	0	1
	1	0	1	1	0
	1	0	1	1	1
	1	1	0	0	0
	1	1	0	0	1
	1	1	0	1	0
	1	1	0	1	1
	1	1	1	0	0
	1	1	1	0	1
	1	1	1	1	0
	1	1	1	1	1

- 1 Bit = 6 dB
- 2 Bit = 12 dB

- 16 Bit = 96 dB
- 24 Bit = 144 dB
- 32 Bit = 192 dB