Musical Physics

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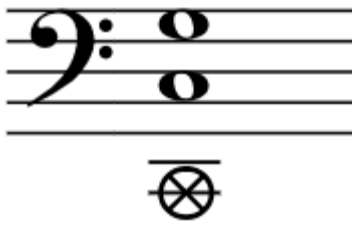
GSP Seminar

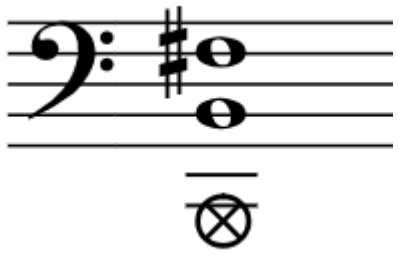


$$f_G = 97.77 \text{ Hz}$$

$$f_C = 65.19 \text{ Hz}$$

$$f_G - f_C = 32.59 \text{ Hz}$$

$$32.59 \text{ Hz} = f_C{}' \text{ (one octave below } f_C)$$

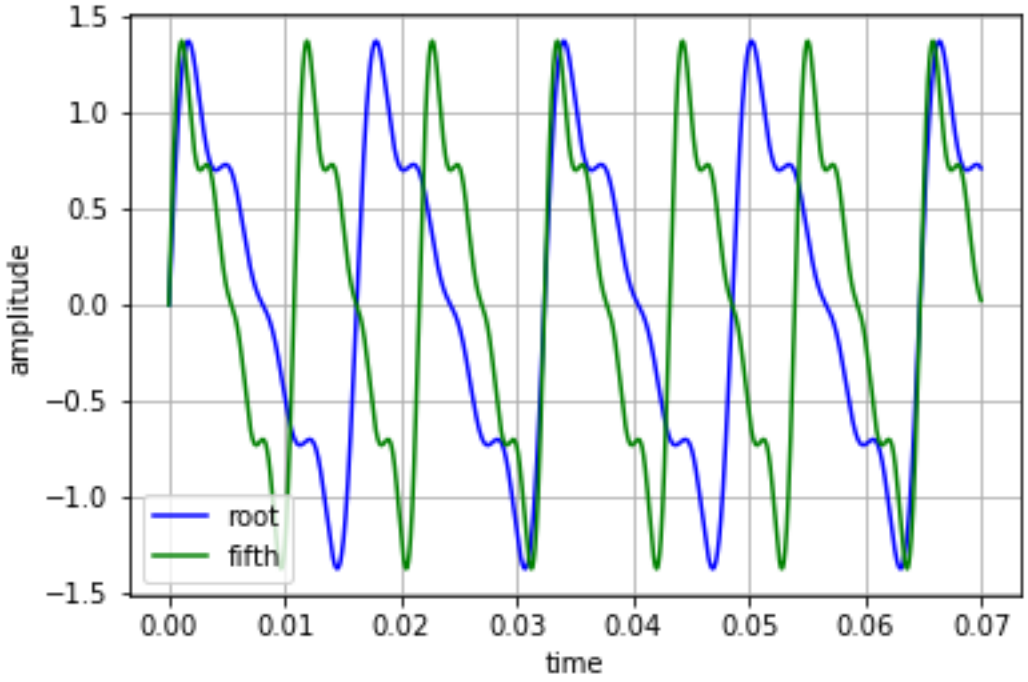


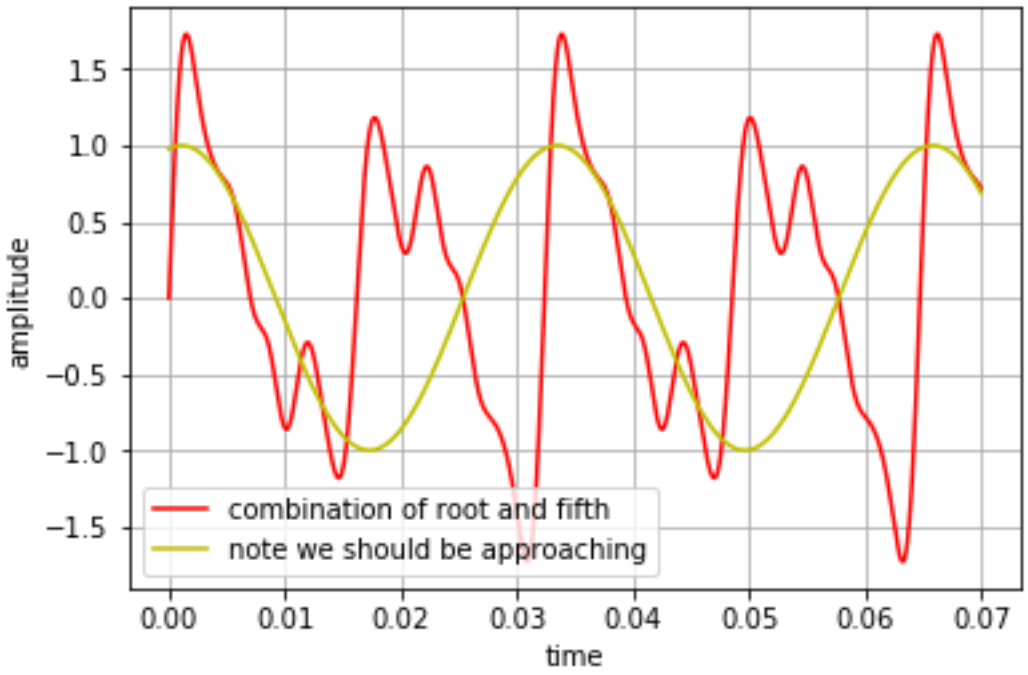
$$f_{F\#} = 82.5 \text{ Hz}$$

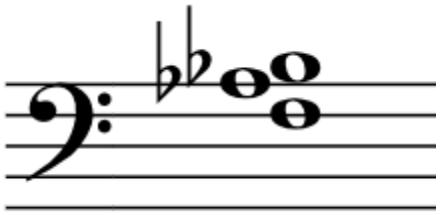
$$f_B = 55 \text{ Hz}$$

$$f_{F\#} - f_B = 27.5 \text{ Hz}$$

$27.5 \text{ Hz} = f_B{}'$ (one octave below $f_B \Rightarrow$ threshold of human hearing)

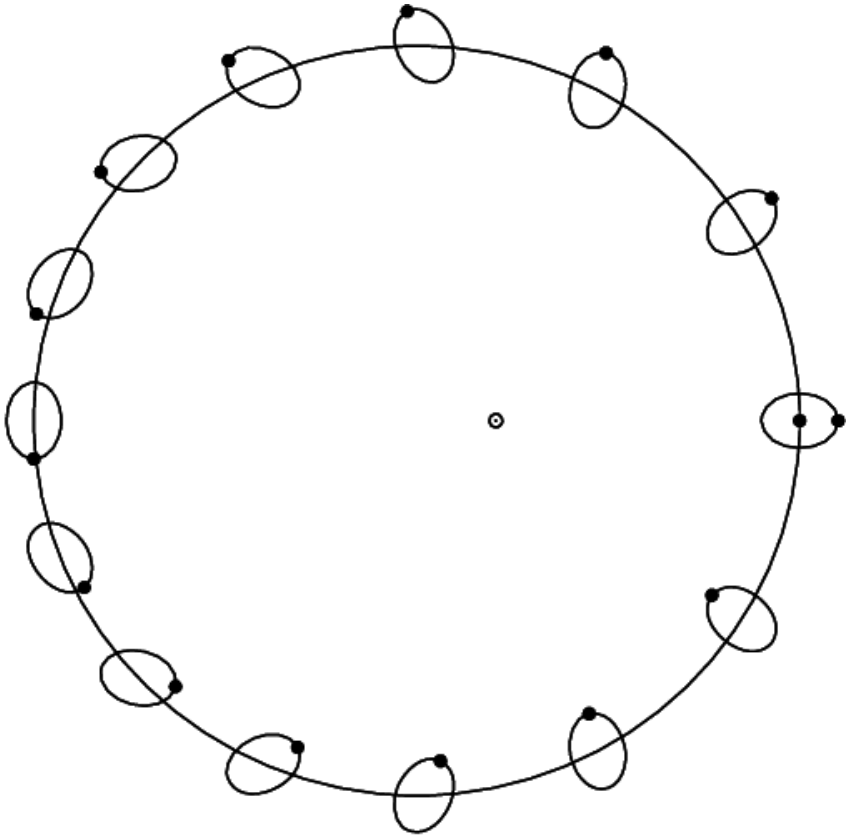

1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
amplitude
root
fifth
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
time


1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
amplitude
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
time
combination of root and fifth
note we should be approaching



$$1 = \frac{27}{16}A + \frac{3}{2}B + \frac{5}{4}C$$

$A, B, C \in \{\text{integers}\}$



$$f_{\text{orbit}} = \frac{1}{T_{\text{orbit}}} = \frac{1}{87.969 \text{ days}}$$

$$f_{\text{spin}} = \frac{1}{T_{\text{spin}}} = \frac{1}{58.646 \text{ days}}$$

$$\text{“Fundamental of Mercury”} = \frac{1}{f_{\text{spin}} - f_{\text{orbit}}} = 174.938 \text{ days}$$

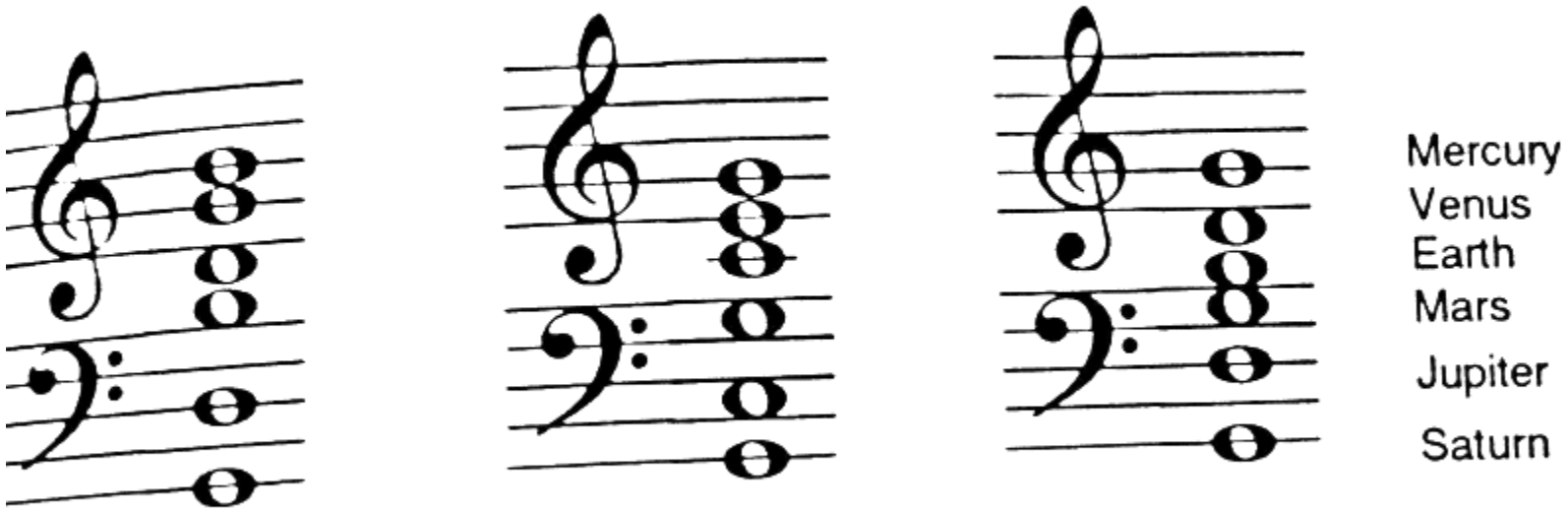


FIGURE 6.2. Alternate planetary chords of 1599

from
The Music of the Heavens
Bruce Stephenson

223 synodic periods of the Moon (lunations) at 29.5306 days each	= 6,585.32 days
19 eclipse years of the Sun at 346.6201 days each	= 6,585.78 days
239 anomalistic months of the Moon (revolution from perigee to perigee) at 27.55455 days each	= 6,585.54 days

from
Totality: Eclipses of the Sun
Fred Espenak, Ken Willcox, and Mark Littmann