output. Therefore at the time $3l/c$ the output current drops down to the value $2U_g e^{-al} - 2U_g e^{-3al}$ which is close to zero. After an additional interval of $2l/c$ there adds the term $2U_g e^{-5al}$ etc. and the result is a square wave of the frequency of the first formant of the neutral vowel $F_1 = c/4l$, the amplitude of which decays by the factor of e^{-4al} per period until the stationary condition of $u_0 = U_g$ has been reached.

One interesting feature of this derivation, see Fant (1967) for further details, is that the square wave is the sum of all formants up to n = infinity of the neutral vowel, compare fig. 14. It is simpler and physically more basic than a derivation in terms of the equivalent damped oscillations and suggests simple methods of synthesis of a neutral vowel.

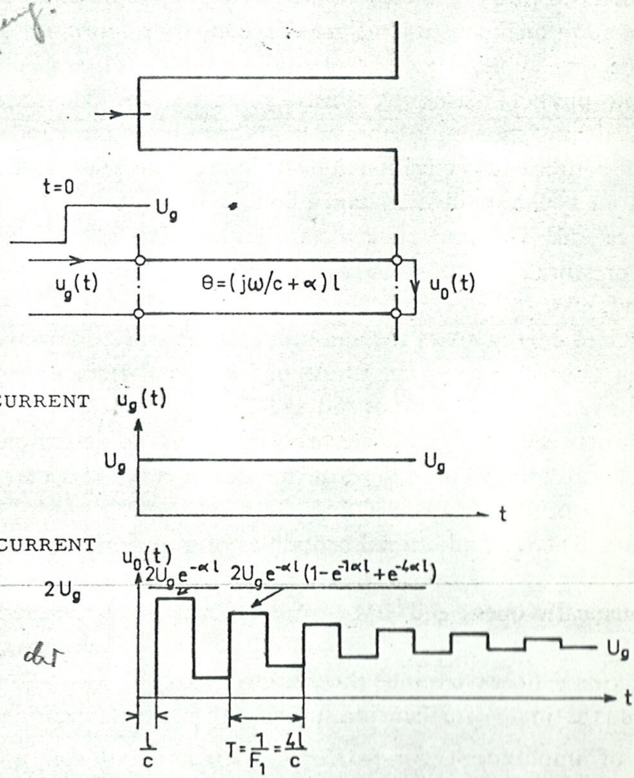


Fig. 15. Time-domain derivation of the volume velocity response at the open end of a single tube resonator to a step shaped volume velocity (current) excitation at the glottal end. The damped square wave originating from repeated reflexions has a basic frequency of F_1 and constitutes the sum of all formants up to infinity.

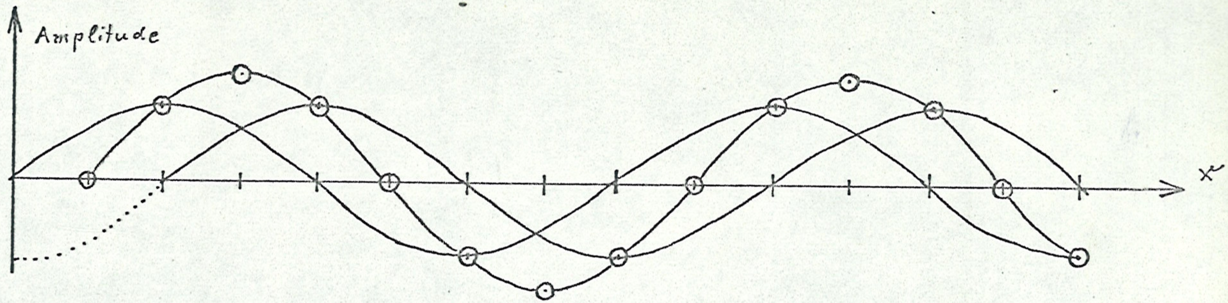
Dia 2/07
Neg. 87/88

Dia 2/07

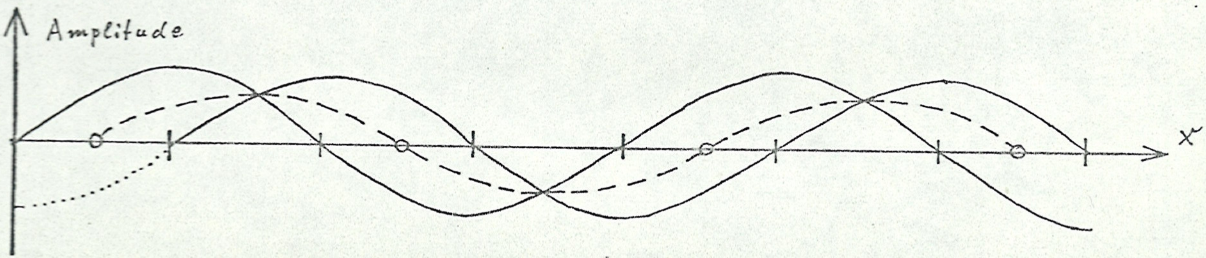
Vorl.

Superposit[illegible] zweier Sinuskurven

punktweise Addition der Amplitudenwerte $A_1(x) + A_2(x)$,
wobei x = räumliche Ausdehnung oder = Zeitverlauf gesetzt werden kann.



resultierende mittlere Kurve $A_m(x) = \frac{A_1(x) + A_2(x)}{2}$



$A_r(x) = 2\,A_m(x)$