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SOLVITMEDIA MEMO

To: Taehwan Weon
From: KyungTae Hwang
Subject: Relationship between balance and volume
Update Date:
CC: Manjai Lee, Hyun Je Park

Mathmatical description of the relationship between balance and physical volume in SoundIt®

Denotation of Volume, V = (V_L , V_R), where V_L is the left volume and V_R is the right one.

For V, it holds the following:

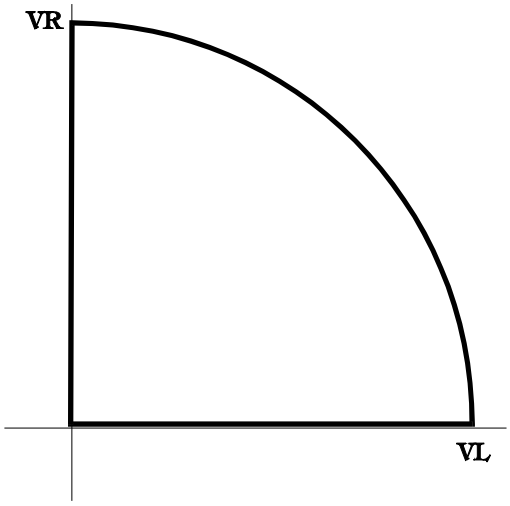
1. $V_L^2 + V_R^2 = R^2$, where R is constant. That is, Volume V can be thought that it goes through real-imaginary coordinate with radious of R.
2. Denoting the angle between V_L-axis, (V_L , 0) and volume vector V, (V_L , V_R) as θ,
   $V_L = X(\theta)$ and $V_R = Y(\theta)$, where X and Y are functions on angle θ.
3. [Boundary condition] V_L and V_R exist between 0 and R, which means that θ ranges from 0 to $\pi/2$.

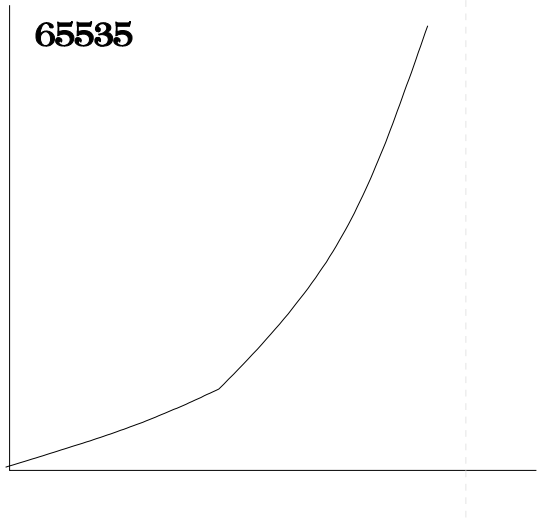
Thinking from the conditions above, we can choose the angle θ as balance variable so that we can calcurate new Volume V′ when given new θ':

$V_L' = R \cos\theta'$ and $V_R' = R \sin\theta'$ ---------- (1)

Reversly, we can also determine the angle θ from given vector, V.

$\theta = \tan^{-1}(V_R/V_L)$ ---------- (2)


VR
VL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