De trillingen hebben dezelfde frequentie

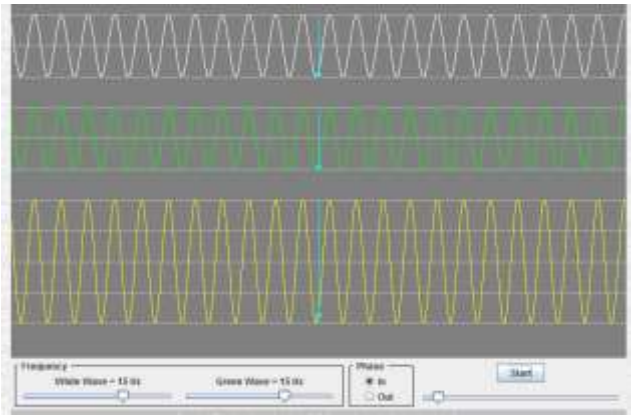
$$y_1 = A_1 \sin(\omega t + \varphi_1)$$

+

$$y_2 = A_2 \sin(\omega t + \varphi_2)$$

=

$$y = A\sin(\omega t + \varphi)$$



$$y = y_1 + y_2 = A_1 \sin(\omega t + \varphi_1) + A_2 \sin(\omega t + \varphi_2)$$

$$= A_1(\sin \omega t \cos \varphi_1 + \cos \omega t \sin \varphi_1) + A_2(\sin \omega t \cos \varphi_2 + \cos \omega t \sin \varphi_2)$$

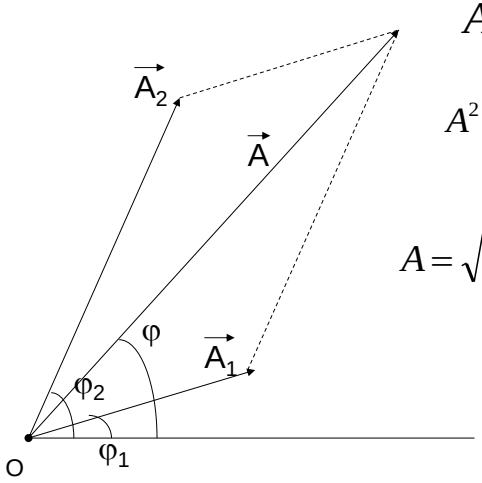
$$= \sin \omega t(A_1 \cos \varphi_1 + A_2 \cos \varphi_2) + \cos \omega t(A_1 \sin \varphi_1 + A_2 \sin \varphi_2)$$

$$= A\cos \varphi \qquad = A\sin \varphi$$

$$y = A(\cos \varphi \sin \omega t + \sin \varphi \cos \omega t)$$

$$y = A\sin(\omega t + \varphi)$$

A van de nieuwe trilling

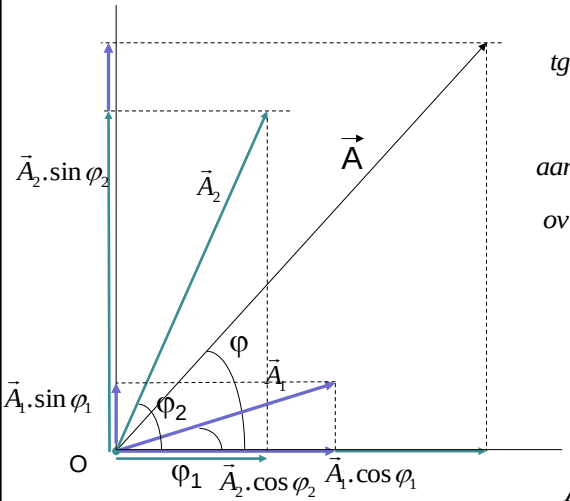


$$\vec{A} = \vec{A}_1 + \vec{A}_2$$

$$A^2 = A_1^2 + A_2^2 + 2A_1.A_2\cos(\varphi_2 - \varphi_1)$$

$$A = \sqrt{A_1^2 + A_2^2 + 2A_1.A_2\cos(\varphi_2 - \varphi_1)}$$

φ van de nieuwe trilling



$$tg\varphi = \frac{overstaande}{aanliggende}$$

$$aanliggende = A_1\cos\varphi_1 + A_2\cos\varphi_2$$

$$overstaande = A_1\sin\varphi_1 + A_2\sin\varphi_2$$

$$tg\varphi = \frac{A_1\sin\varphi_1 + A_2\sin\varphi_2}{A_1\cos\varphi_1 + A_2\cos\varphi_2}$$

Voorbeeld

Stel volgende trillingen samen:

$$y_1 = 5{,}00 \sin 2{,}00\pi t \quad y_2 = 4{,}00 \sin\left(2{,}00\pi t + \frac{2\pi}{3}\right)$$

$$A = \sqrt{5^2 + 4^2 + 2.5.4\cos\frac{2\pi}{3}} = \quad 4{,}58m$$

$$tg\,\varphi = \frac{5{,}00\sin 0 + 4{,}00\sin\frac{2\pi}{3}}{5{,}00\cos 0 + 4{,}00\cos\frac{2\pi}{3}} = \quad \frac{3{,}46}{3} = 1{,}15$$

$$Arctg\,1{,}15 = 0{,}855$$

$$y = 4{,}58\sin(2{,}00\pi t + 0{,}855)$$