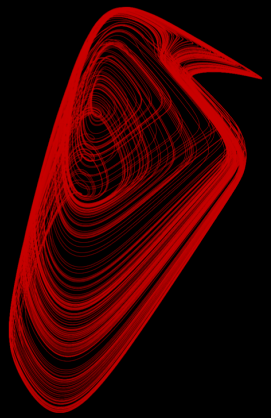
La guitarra electrica,
el nacimiento de lo fuerte

1966… Eric Clapton reina en Londres

Jimmi de visita en Londres, le pide Jammear con el,
Sube al escenario con su Stratoscaster y …

Jimmi de visita en Londres, le pide Jammear con el,
Sube al escenario con su Stratoscaster y …



Fender

Gibson

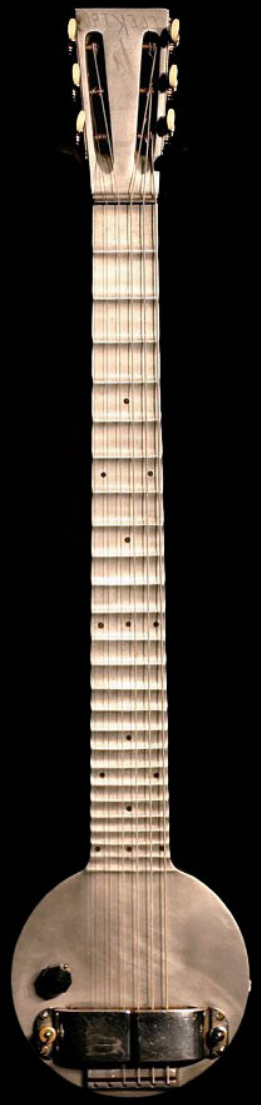
Fender

Timbre brillante

Gibson

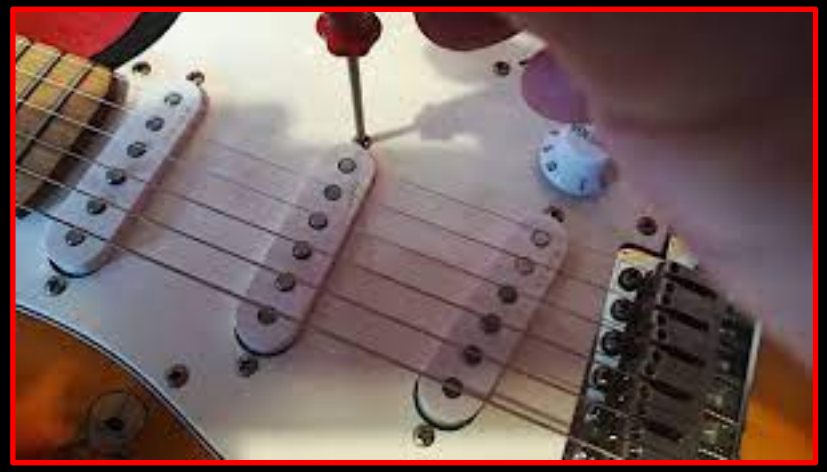
Timbre calido

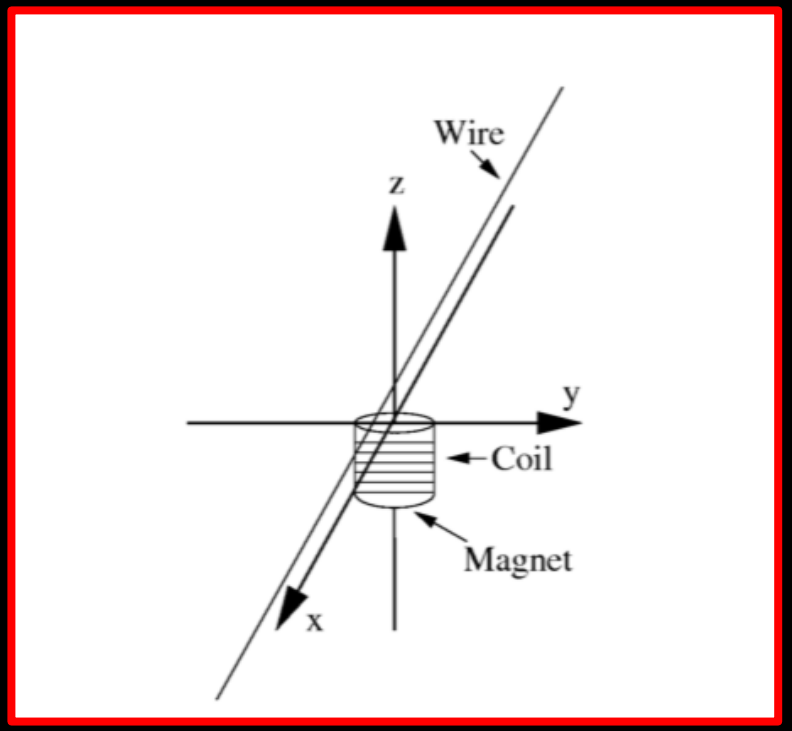
Dobro (1925)

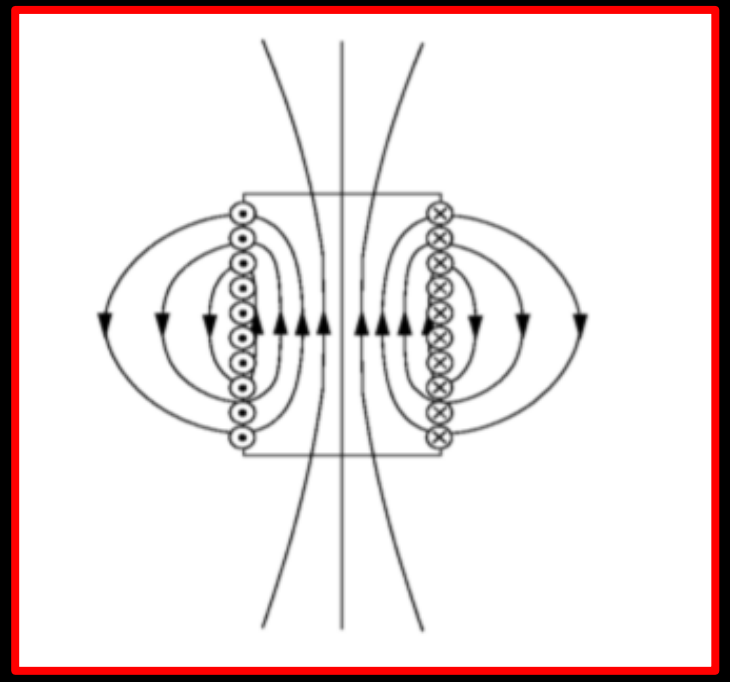


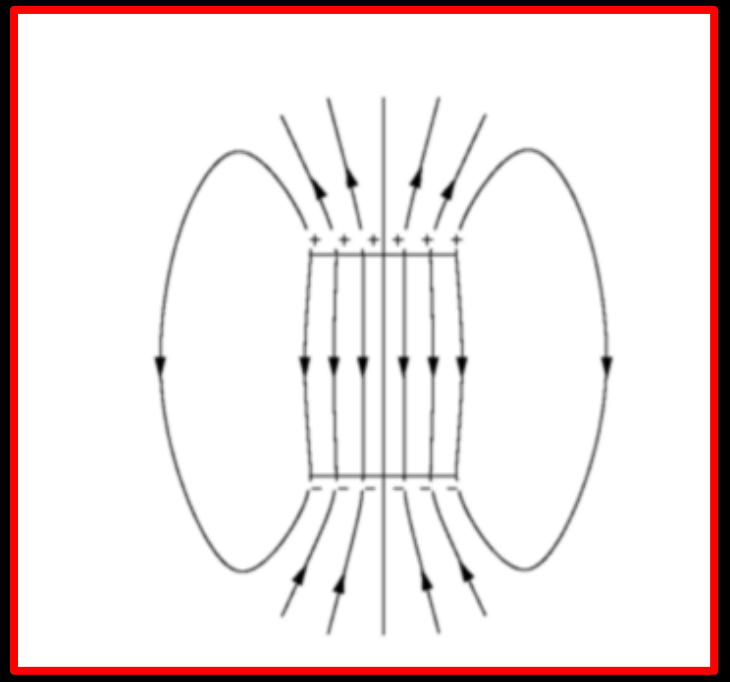
Sarten de Rickenbacker, 1932

Gibson Les Paul 1954

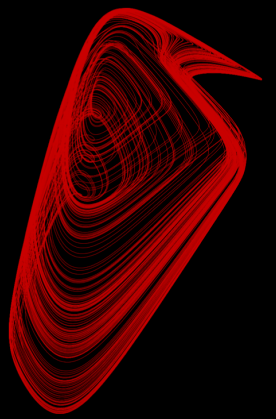



Wire
z
y
Coil
Magnet
x

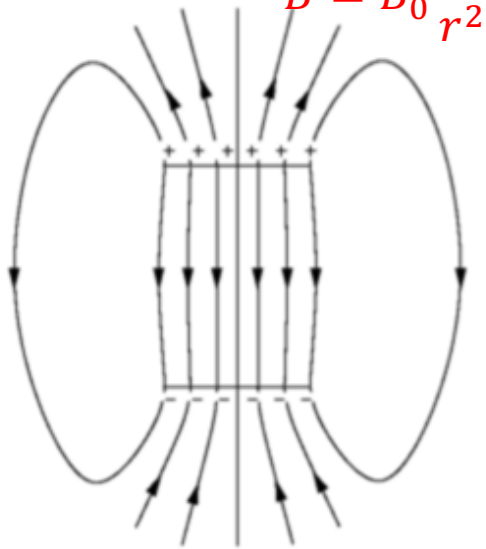




Para el calculo del campo afuera del material, es equivalente

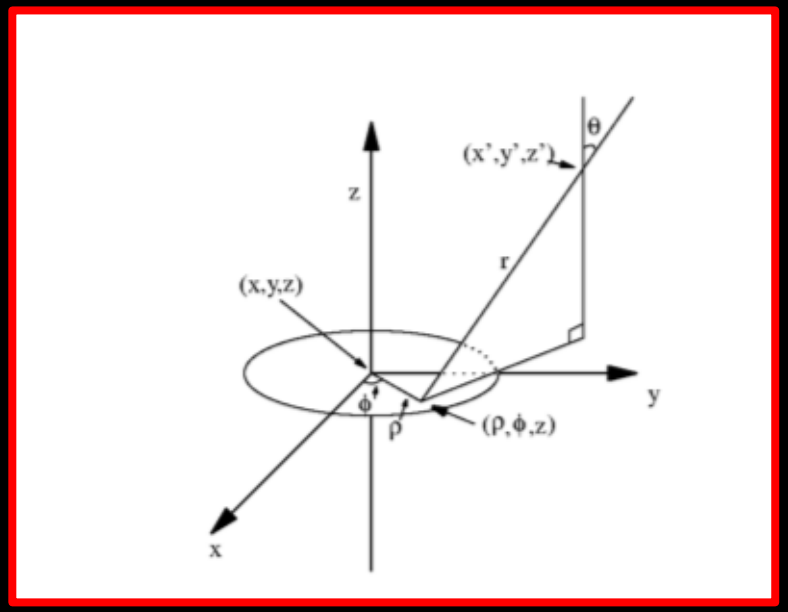


$$\vec{B} = B_0 \frac{1}{r^2} \vec{e_r}$$



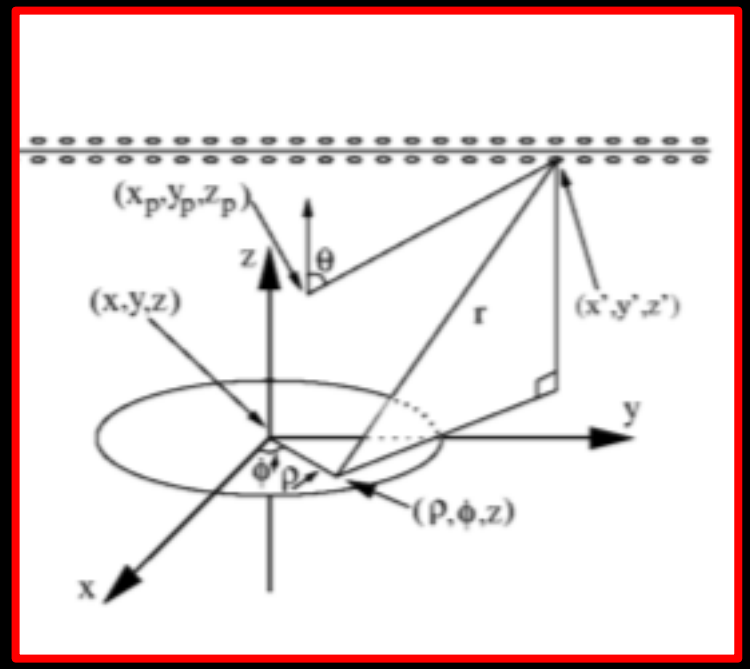
$$B_z = B_0 \frac{\Delta z}{r^3}$$

En algun momento vamos a tener que calcular el $\vec{B}.\vec{n}\, da$, y por eso vamos a pensar en la proyeccion z



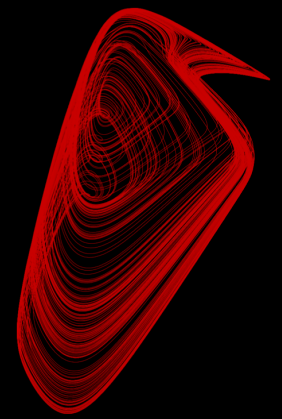
$$B_z(x', y', z') = \int_0^{2\pi} \int_0^{\psi} \frac{\sigma(z' - z)\varrho}{((x' - (x - \rho cos\phi))^2 + (y' - (y - \rho sin\phi))^2 + z' - z^2)^{3/2}} d\varrho d\phi$$

$$|\vec{B}_{cable}| = \int_0^{2\pi} \int_0^{\psi} \frac{\sigma\varrho}{((x' - (x - \rho cos\phi))^2 + (y' - (y - \rho sin\phi))^2 + z' - z^2)} d\varrho d\phi$$



Y entonces, en el cable se induce una carga magnetica proporcional a ese campo, cuya contribucion a la componente z del campo en (x_p, y_p, z_p) es

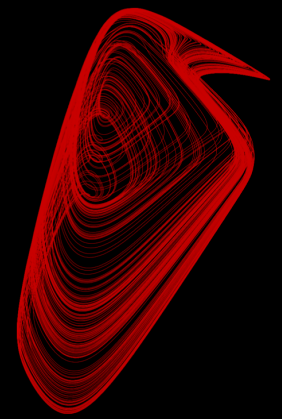
$$B_{del\ cable,z} = \gamma\ |\vec{B}_{cable}| \frac{(z' - z_p)}{((x' - x_p)^2 + (y' - y_p)^2 + (z' - z_p)^2)^{3/2}}$$



$$B_{del\ cable,z} = \gamma \left|\vec{B}_{cable}\right| \frac{(z'-z_p)}{((x'-x_p)^2+(y'-y_p)^2+(z'-z_p)^2)^{3/2}}$$

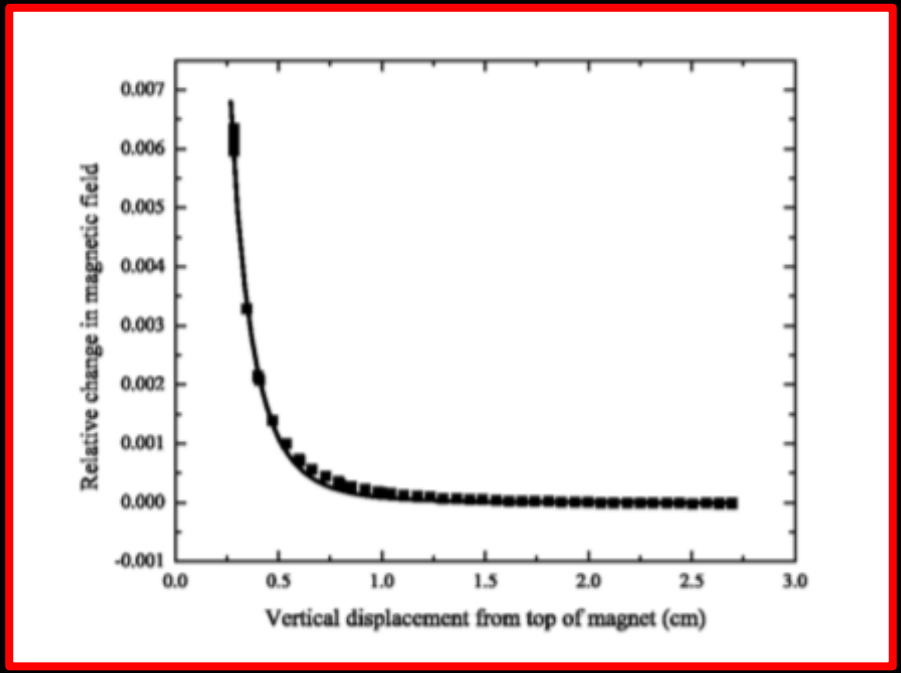
$$\left|\vec{B}_{cable}\right| = \int_0^{2\pi} \int_0^{\psi} \frac{\sigma\varrho}{((x'-(x-\rho cos\phi))^2+(y'-(y-\rho sin\phi))^2+(z'-z)^2)} d\varrho d\phi$$

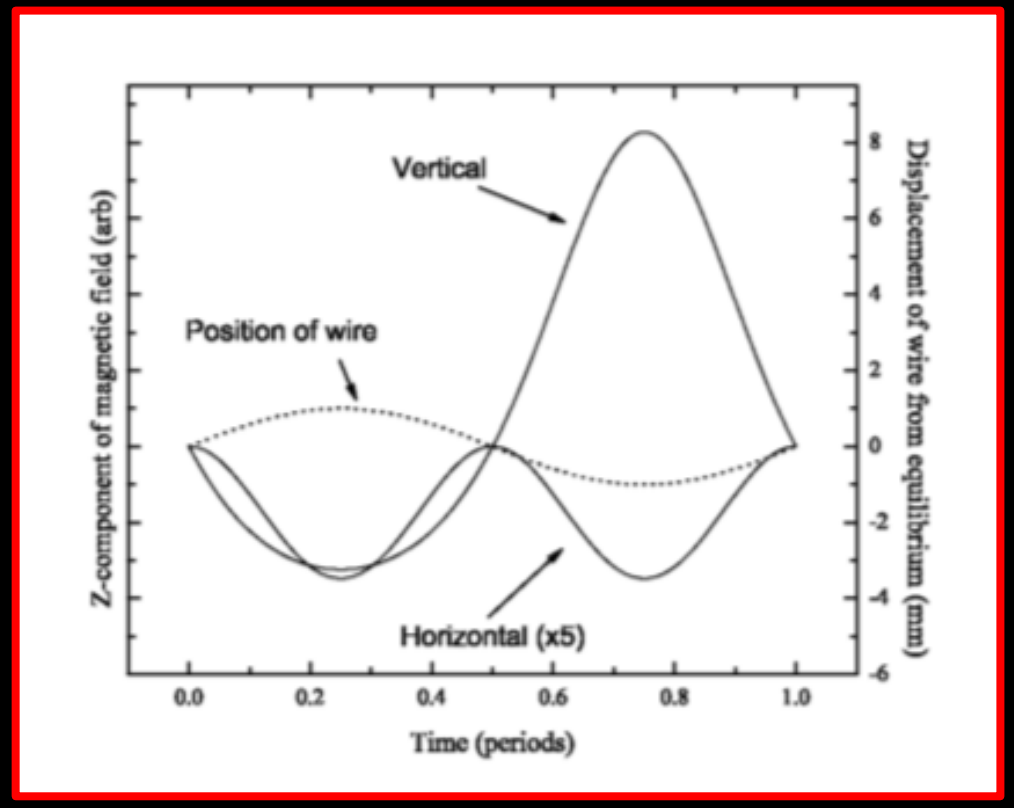
Y queda sumar la contribucion de cada elemento de la cuerda …



Con el cable…

Cambio del campo en la superficie del iman
dependiendo de la altura a la que esta el cable

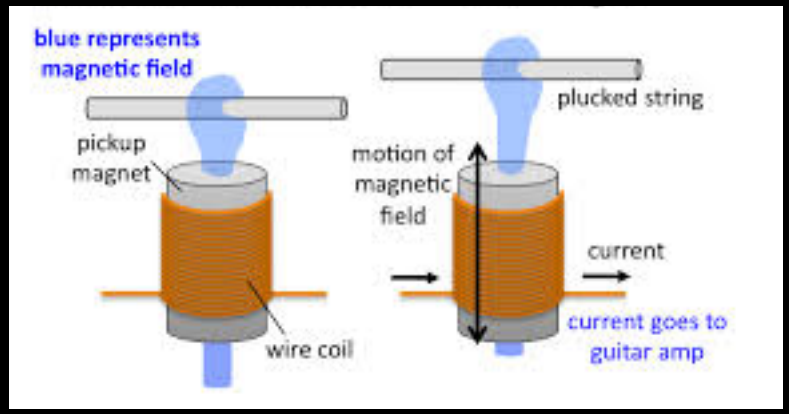




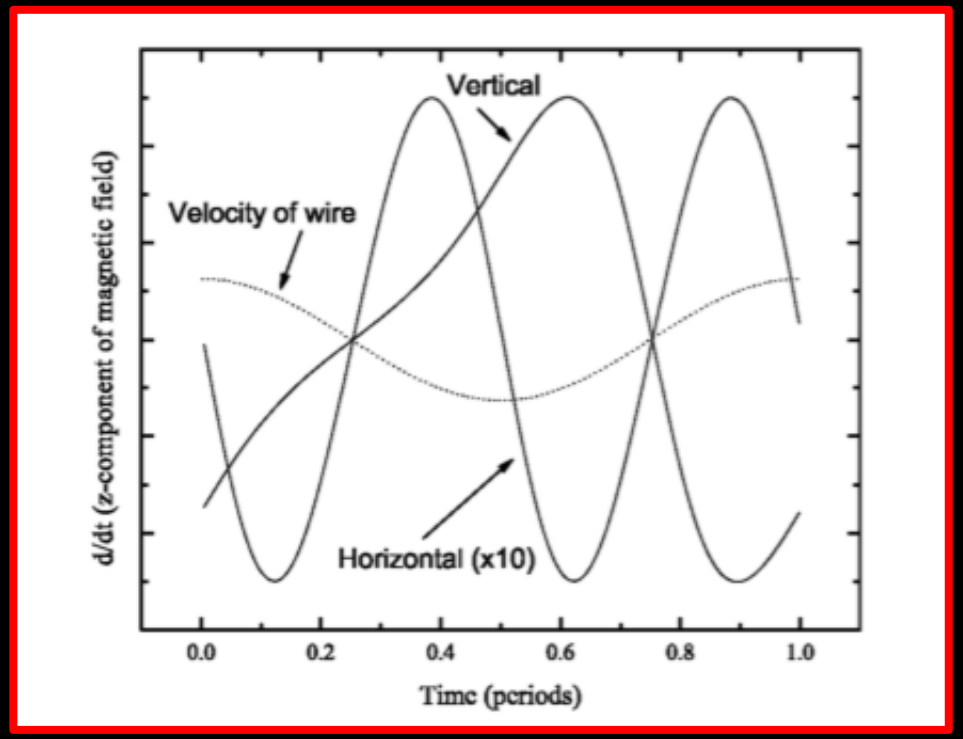
Notar el apartamiento de la forma sinusoidal de la señal

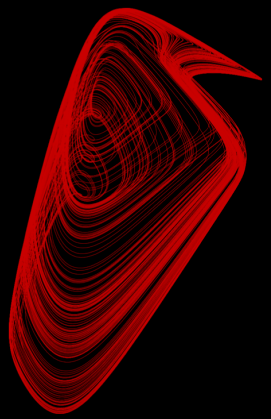
La no linealidad del campo generado entre la cuerda y el iman da una propiedad timbrica nueva. Esto es un instrumento nuevo, electrico, y no un sintetizador

$$\varepsilon = -\frac{\partial \Phi_m}{\partial t}$$

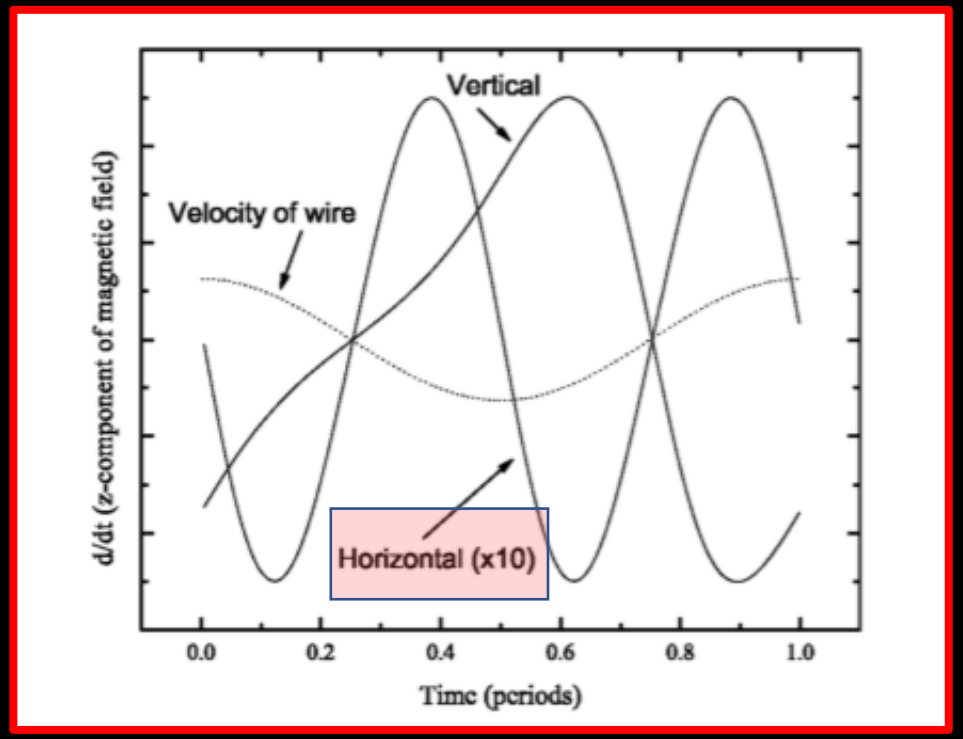


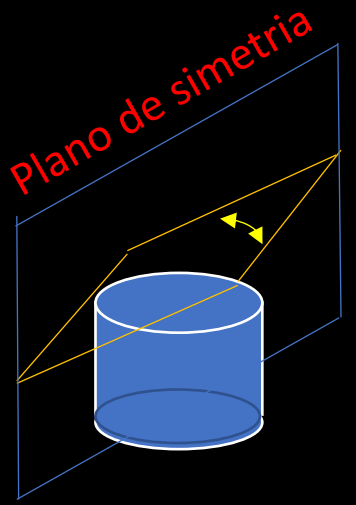
$$\varepsilon = -\frac{\partial \Phi_m}{\partial t}$$

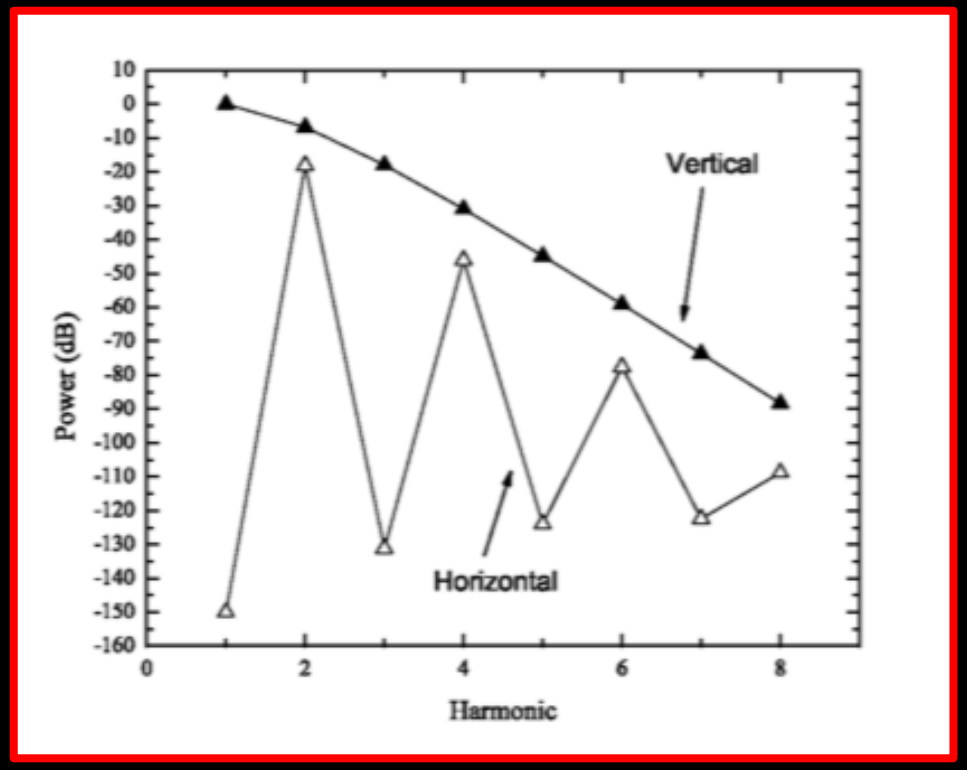


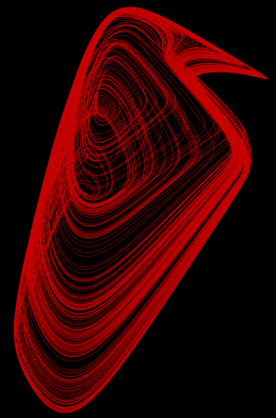


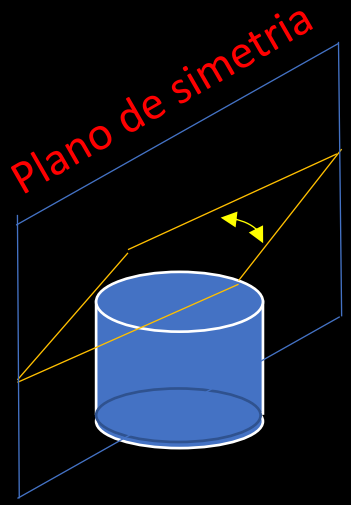
$$\varepsilon = -\frac{\partial \Phi_m}{\partial t}$$

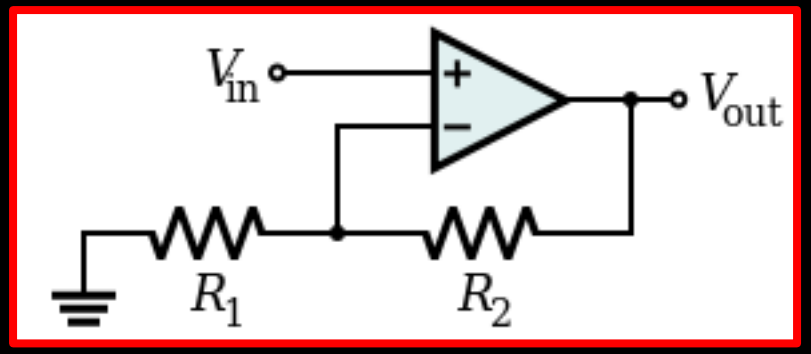





Power (dB)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
0
2
4
6
8
Harmonic
Vertical
Horizontal




Plano de simetria



El amplificador mas sencillo

Opamp con feedback

Opamp

1. Impedancia de entrada muy alta
2. $V_{out} = A(V_+ - V_-)$

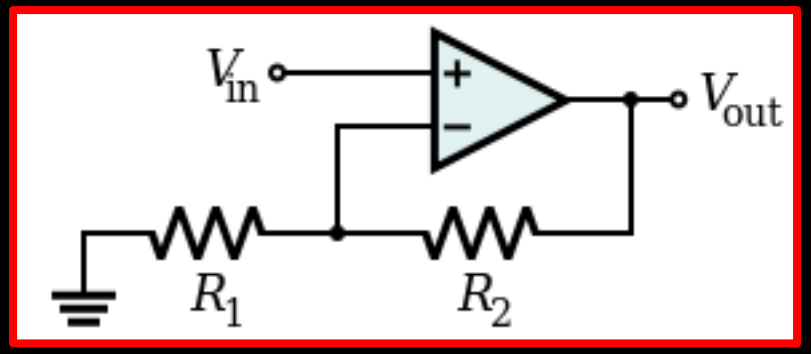
Al tener feedback de la salida a la entrada, $V_- = \beta V_{out}$

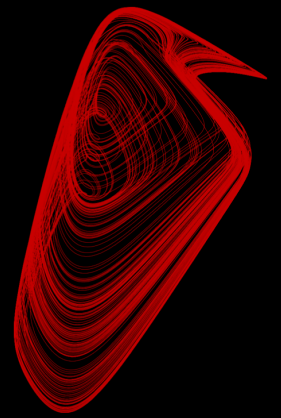
$$\beta = \frac{R_1}{R_1 + R_2}$$

$$V_{out} = A(V_+ - \beta V_{out})$$

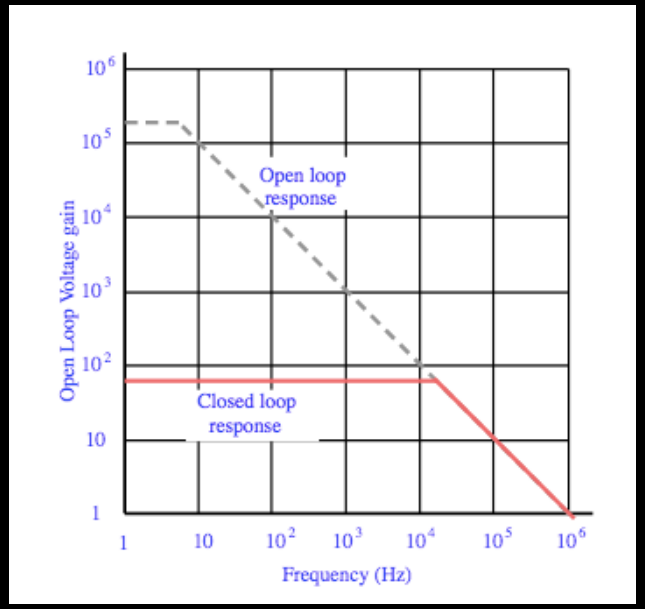
$$V_{out} = V_+ \left(\frac{1}{\beta + \frac{1}{A}}\right)$$

$$V_{out} \sim V_+ \left(1 + \frac{R_2}{R_1}\right)$$





Tener en cuenta: cada
Amplificacion implica
Dependencia con las frecuencias



Sobre el “duelo” Fender Strat y Gibson Les Paul

https://www.youtube.com/watch?v=V7TUaHlkp4M

”brillante”
“Jimmi Hendrix”

GIBSON LES PAUL VS FENDER STRAT | A CLOSER LOOK

“calido”
“Eric Clapton”

	Les Paul	Stratocaster
Body Type	Single Cutaway	Double Cutaway
Body Tonewood	Mahogany	Alder
Top	Maple Cap	None
Scale	24.75"	25.5"
Neck Build	Set neck	Bolt-on neck
Neck Tonewood	Mahogany	Maple
Fretboard	Rosewood	Maple/Rosewood
Bridge	Tune-o-matic	Synchronized Tremolo
Pickups	Two humbuckers	Three single coils
Pickup Switching	Three-way	Five-way
Controls	Two volume and two tone	One volume and two tone

	Les Paul	Stratocaster
Body Type	Single Cutaway	Double Cutaway
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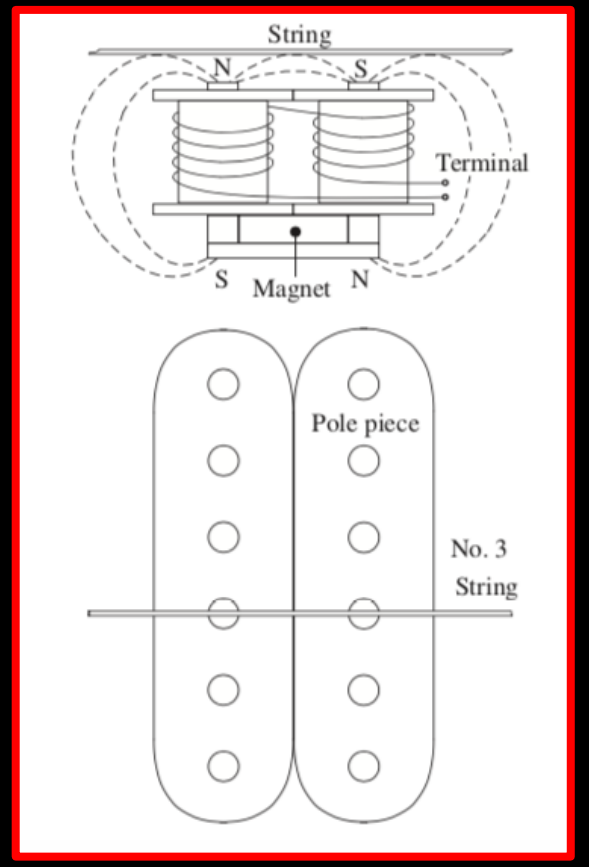
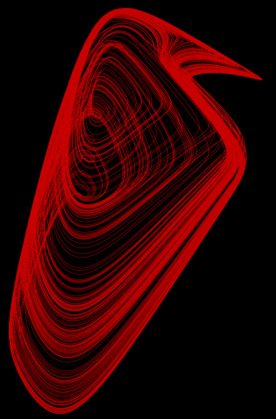
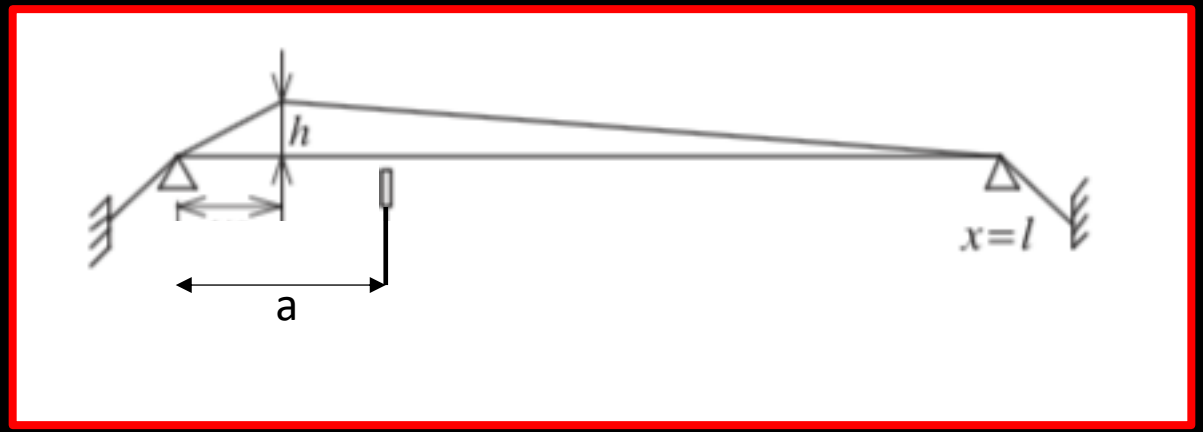


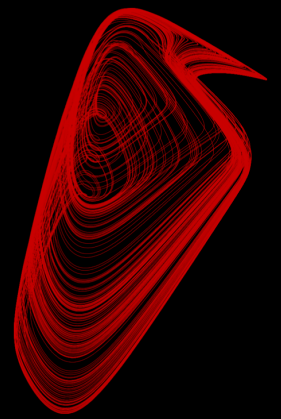
Originalmente, para evitar efectos de antena.



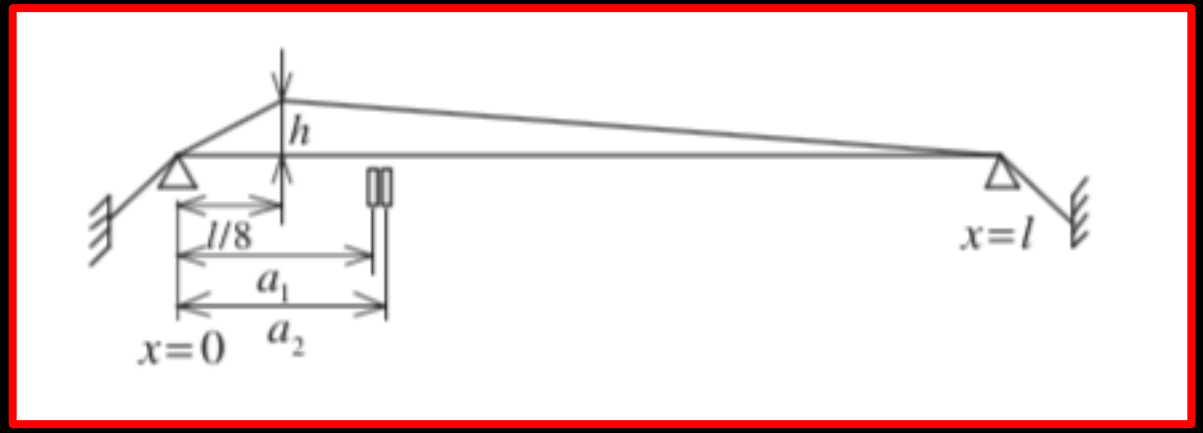
Ya vimos el efecto de una cuerda en el campo total, pero ahora miremos un poc el efecto del campo en la dinamica de la cuerda

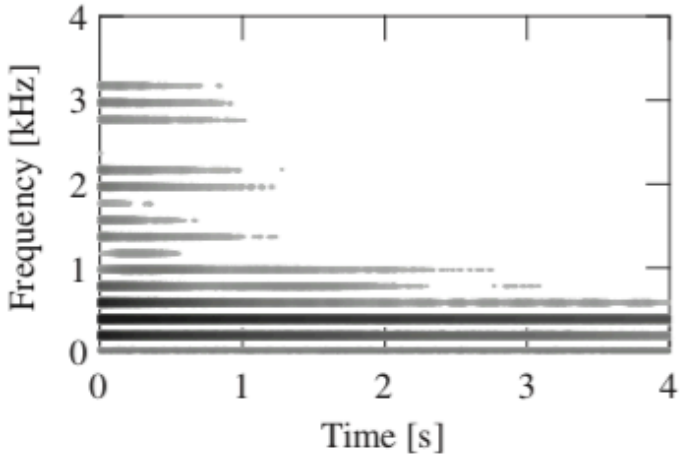
$$\sigma \frac{\partial^2 y}{\partial t^2} = T \frac{\partial^2 y}{\partial x^2} - \delta(x-a)(F - y(a,t))$$



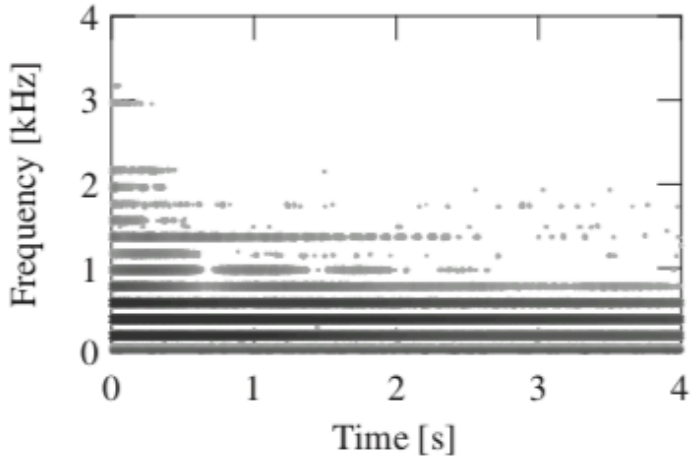


$$\sigma \frac{\partial^2 y}{\partial t^2} = T \frac{\partial^2 y}{\partial x^2} - \sum_i^2 \delta(x - a_i)(F - y(a_i, t))$$



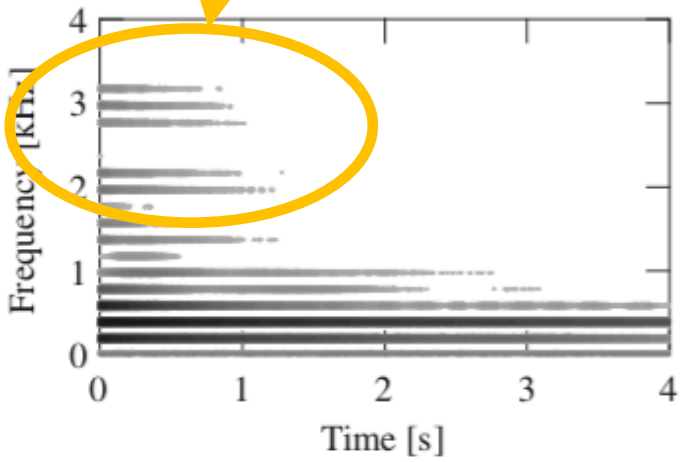


(a) Single-coil pickup

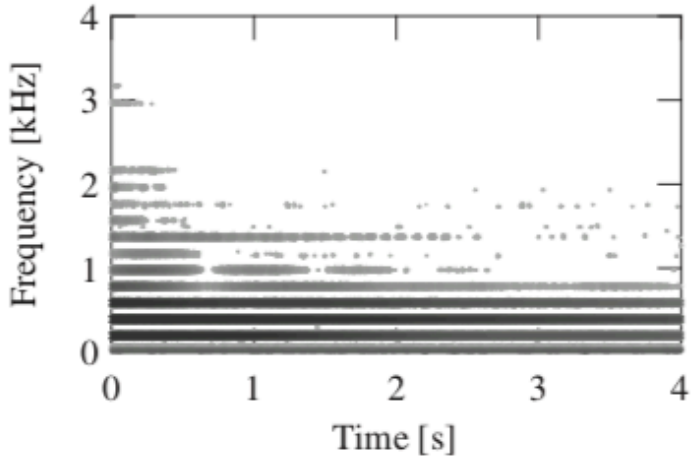


(b) Imitated humbucking pickup

El brillo de la strat de Fender.



(a) Single-coil pickup



(b) Imitated humbucking pickup