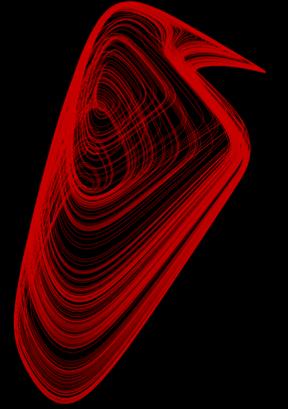
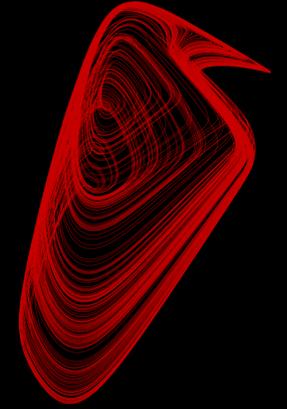


Mas sobre acoples fuente-filtro



Mas sobre acoples fuente-filtro

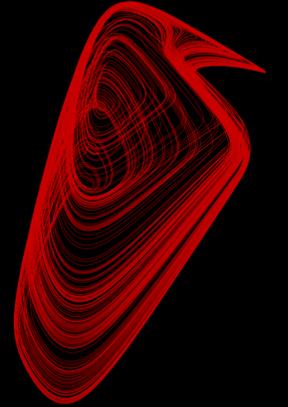


Aproximadamente 50,000 años

Desarrollada por Neanderthales

Las 4 notas generadas coinciden
con cuatro de las notas de la escala
diatonica

Mas sobre acoples fuente-filtro



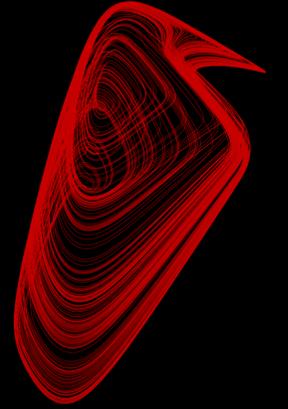
Aproximadamente 50,000 años

Desarrollada por Neanderthales

Las 4 notas generadas coinciden con cuatro de las notas de la escala diatonica

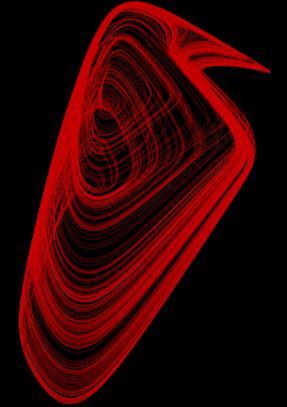


Mas sobre acoples fuente-filtro



Bob Fink added that the notes of the flute “are inescapably diatonic and will sound like a near-perfect fit within ANY kind of standard diatonic scale, modern or antique.”

Mas sobre acoples fuente-filtro



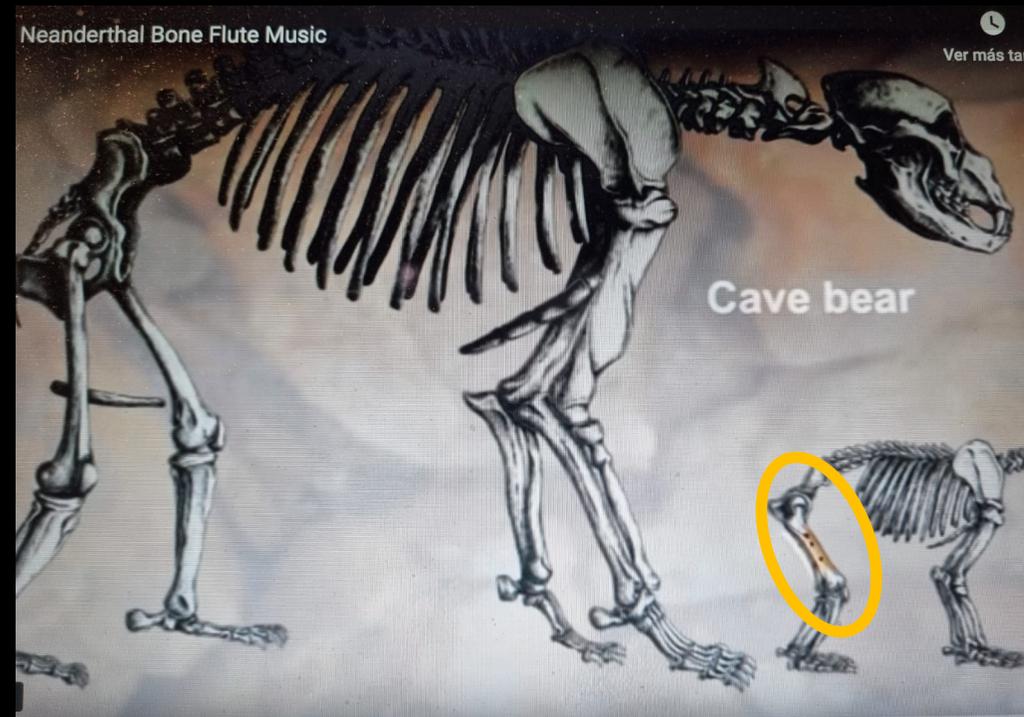
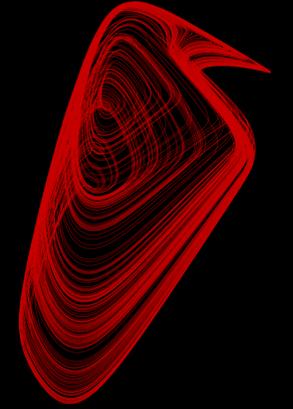
Bob Fink added that the notes of the flute “are inescapably diatonic and will sound like a near-perfect fit within ANY kind of standard diatonic scale, modern or antique.”



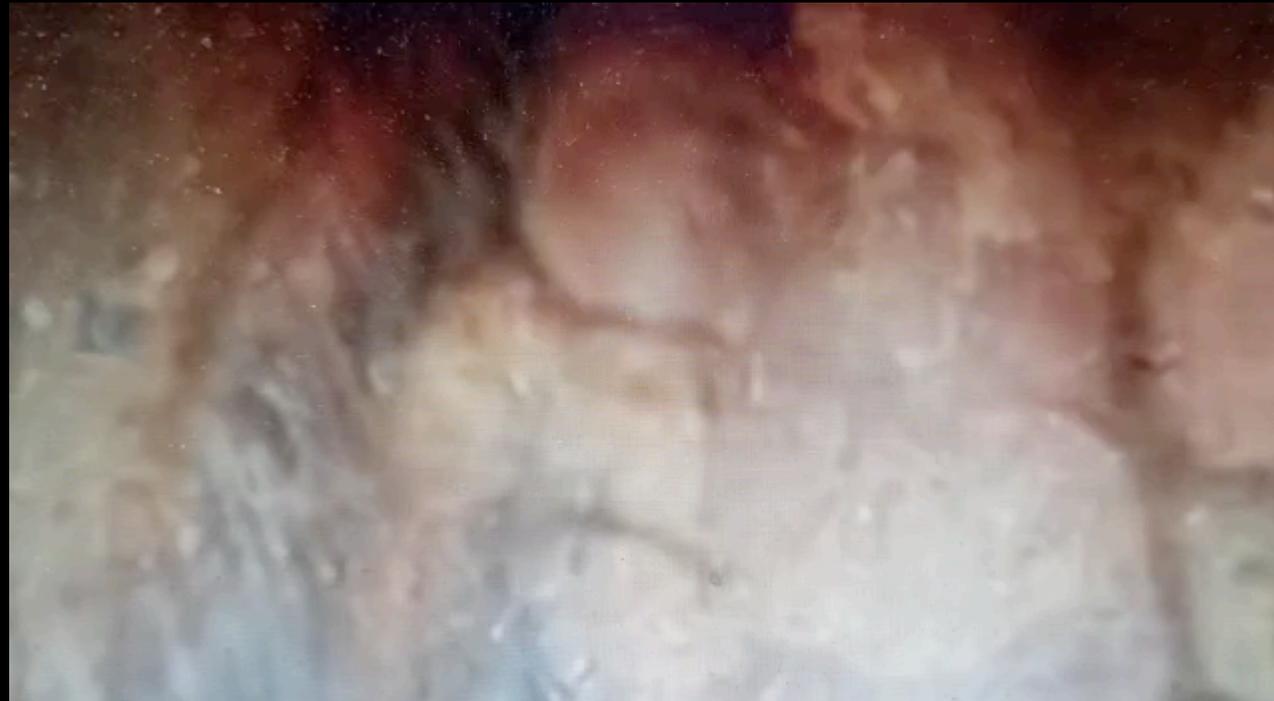
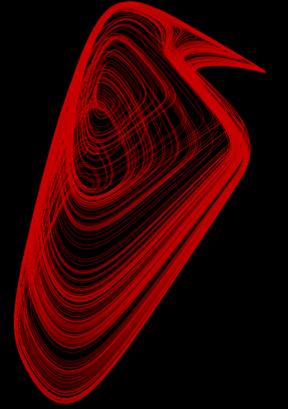
Teclado moderno de piano basado en la escala diatónica. La nota Do se encuentra más a la izquierda de la imagen y siete teclas blancas a la derecha, una octava más aguda.

La escala diatónica es una escala formada por intervalos de segunda consecutivos

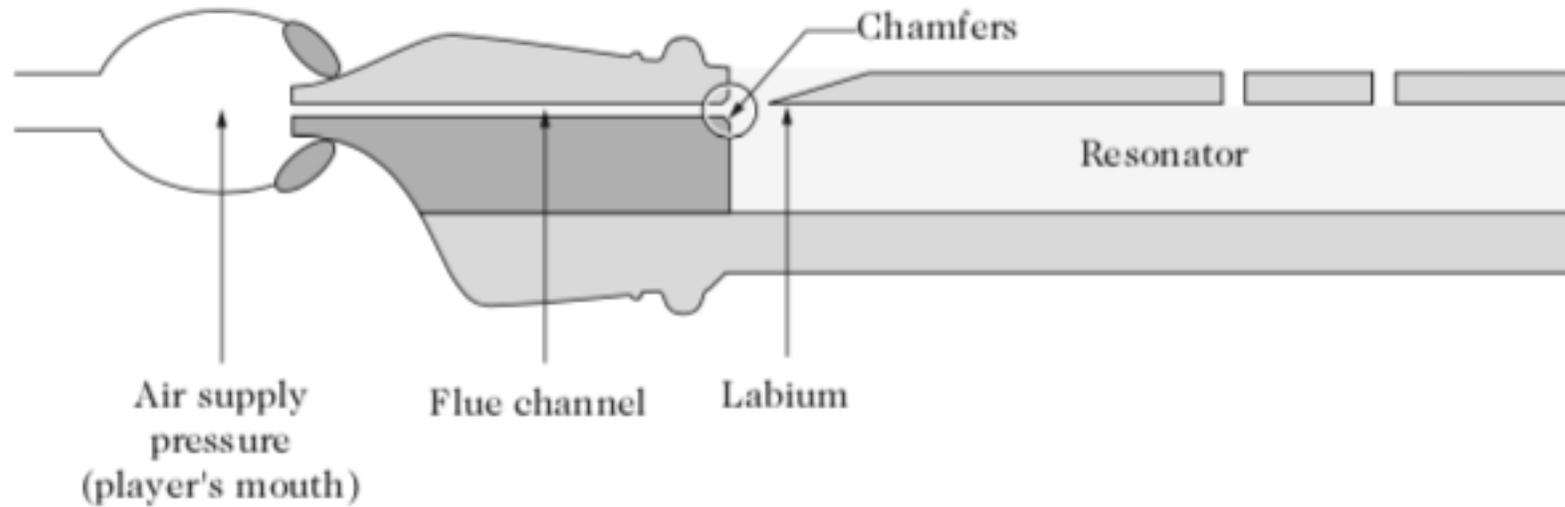
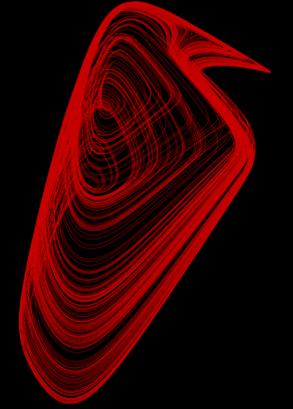
Mas sobre acoples fuente-filtro

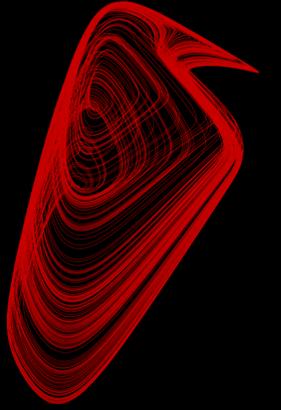


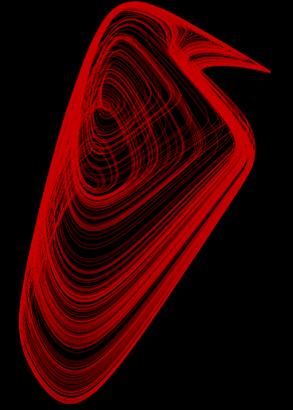
Mas sobre acoples fuente-filtro



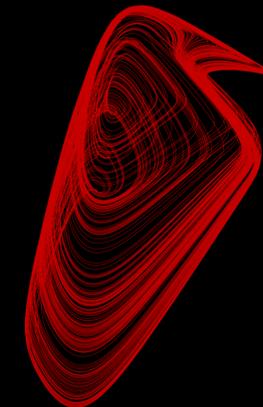
Mas sobre acoples fuente-filtro



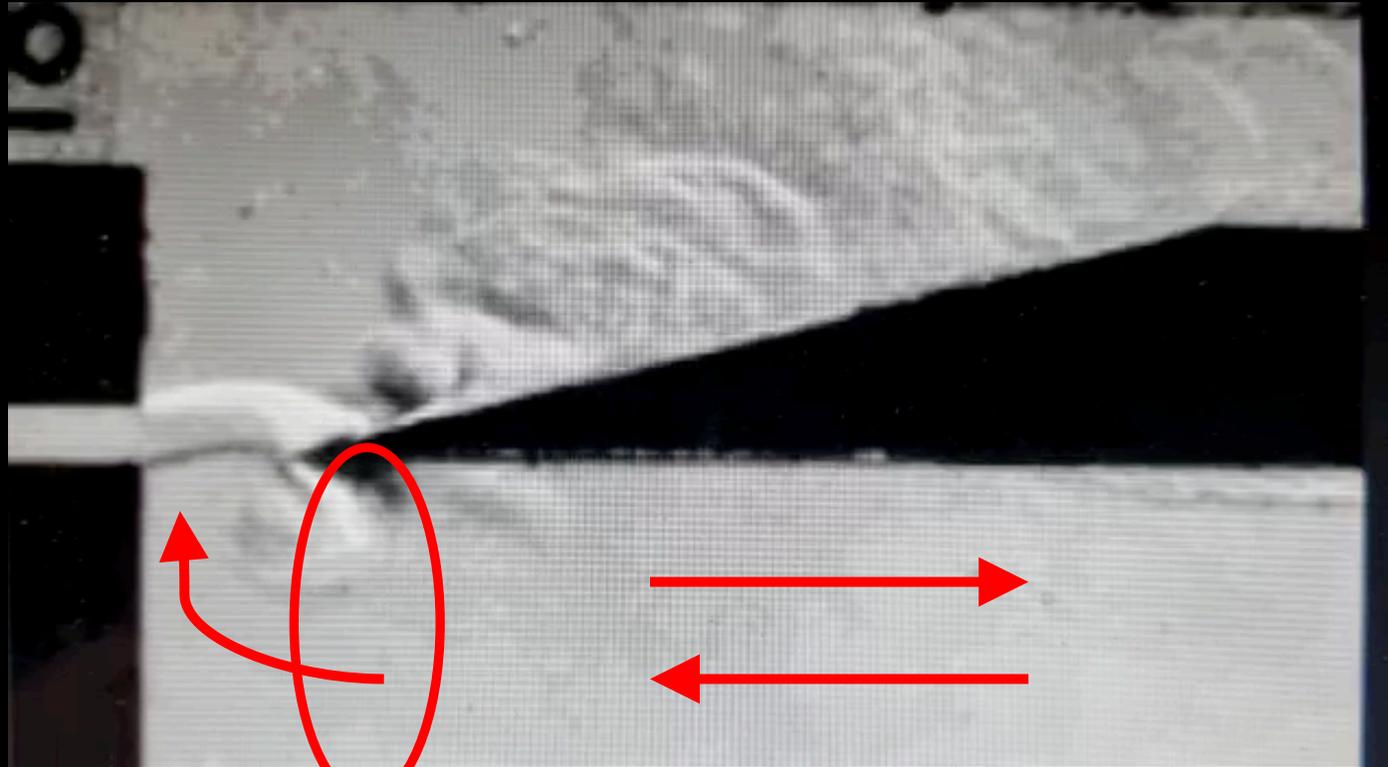




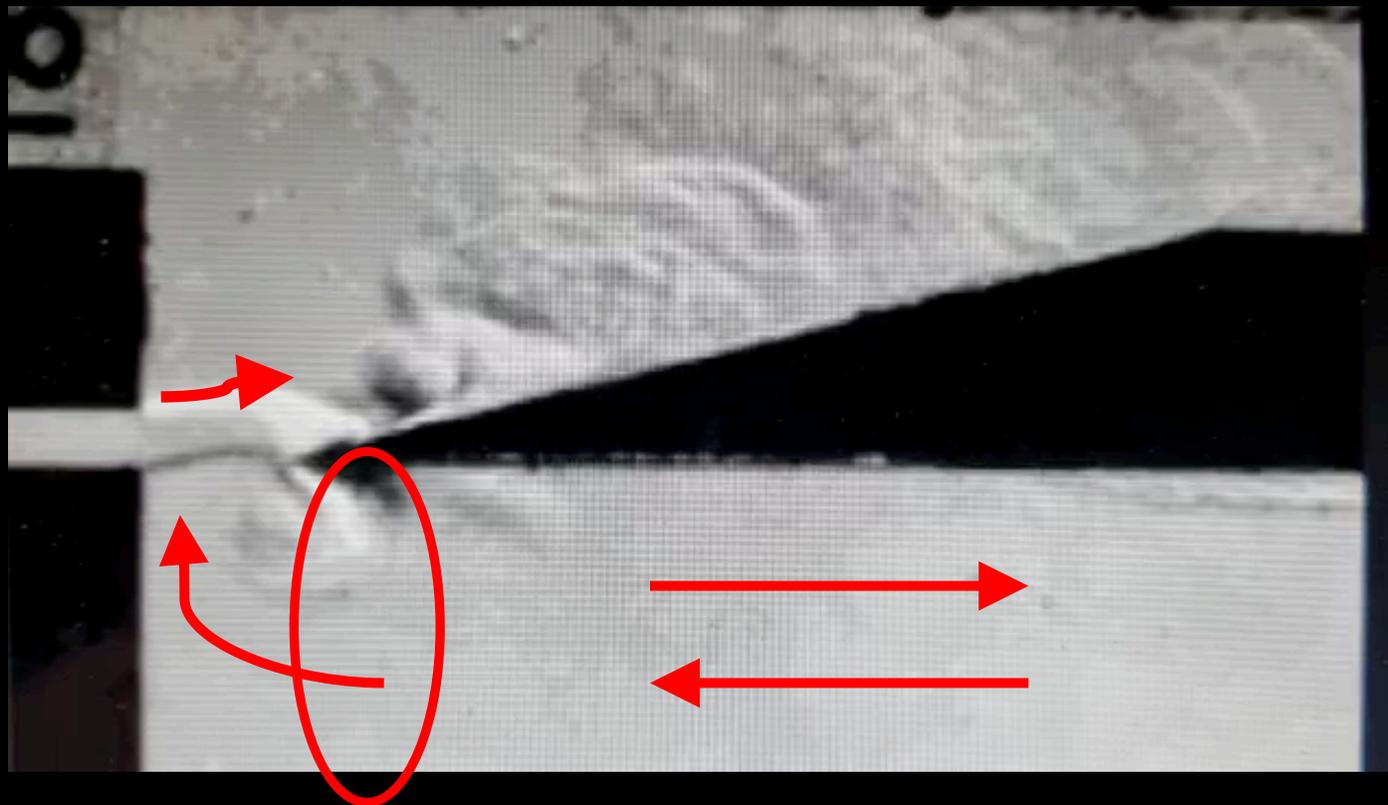
El proceso se inicia con la inyeccion de una perturbacion de la densidad, que genera una onda de presion



Esta perturbacion viaja por el resonador, y luego explora la correspondiente condicion de borde.



Cuando la onda regresa, afecta al jet, desestabilizandolo



La deformacion inducida en el jet, se propagara convectivamente hacia el filo

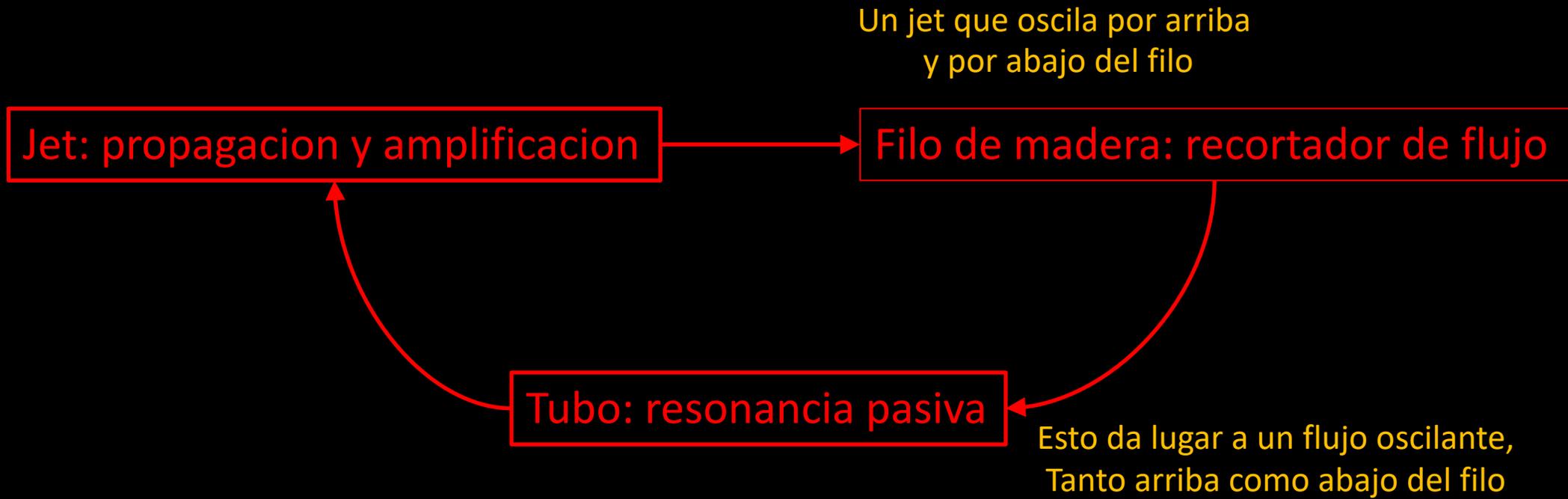
Jet: propagacion y amplificacion

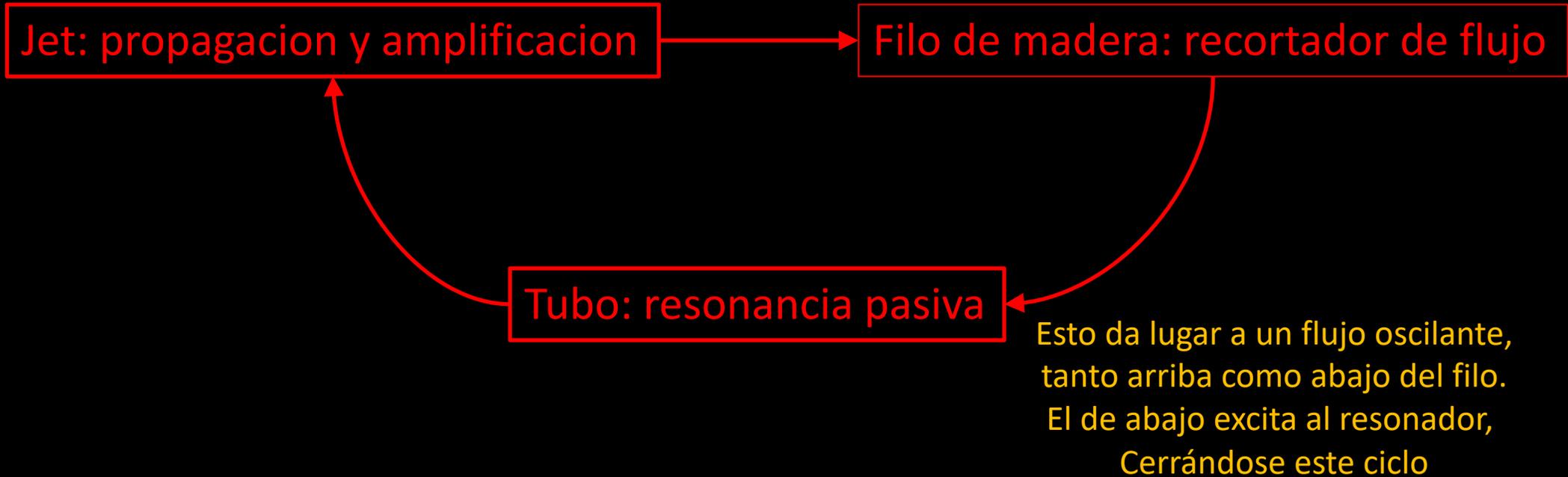
Filo de madera: recortador de flujo

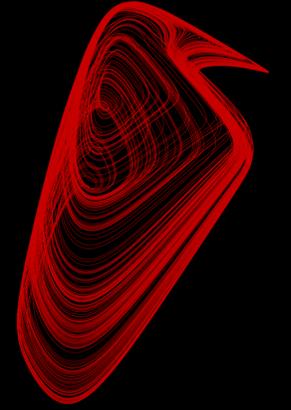
Fluctuacion periodica
en los tiempos del resonador

Tubo: resonancia pasiva



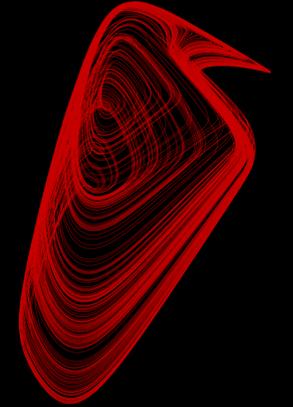






Empecemos por aca

Las mismas ecuaciones, linealizadas
alrededor de una presión y densidad
medias (p_0, ρ_0)



$$\frac{1}{\rho_0} \frac{\partial \rho'}{\partial t} + \nabla \cdot (\mathbf{v}) = q$$

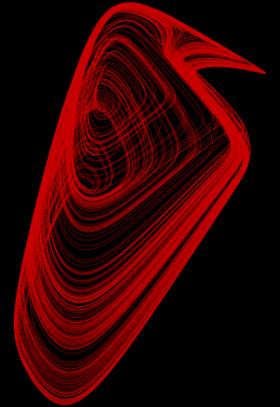
$$\rho_0 \left(\frac{\partial}{\partial t} \right) \mathbf{v} = -\nabla p' + \mathbf{F}$$

$$\rho' = p' / c_0^2$$

Que llevan a las famosas

$$\left(\frac{1}{c_0^2} \frac{\partial^2}{\partial t^2} - \nabla^2 \right) p = \rho_0 \frac{\partial q}{\partial t} - \nabla \cdot \mathbf{F}$$

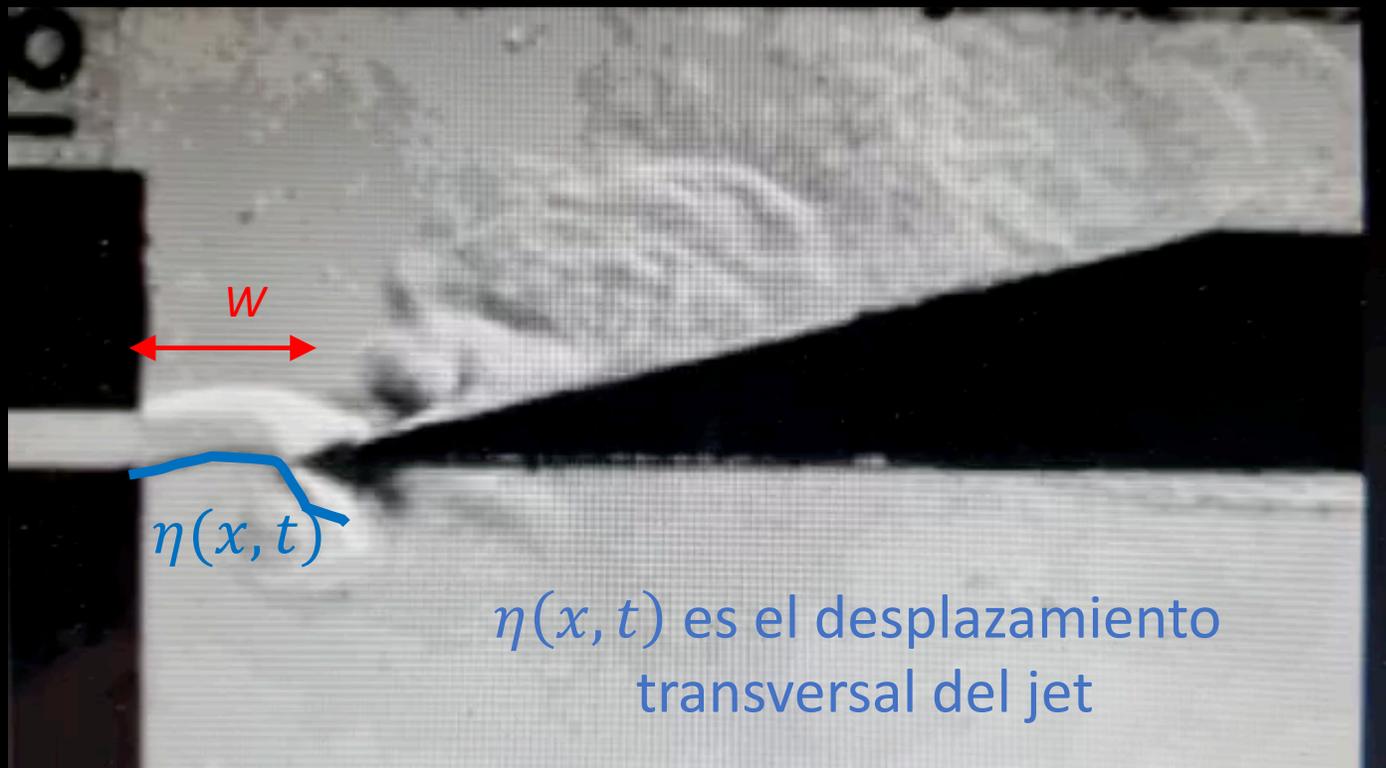
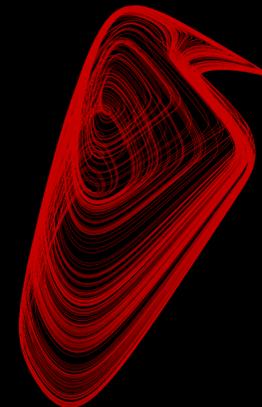
Con q un flujo de entrada, por
unidad de volumen



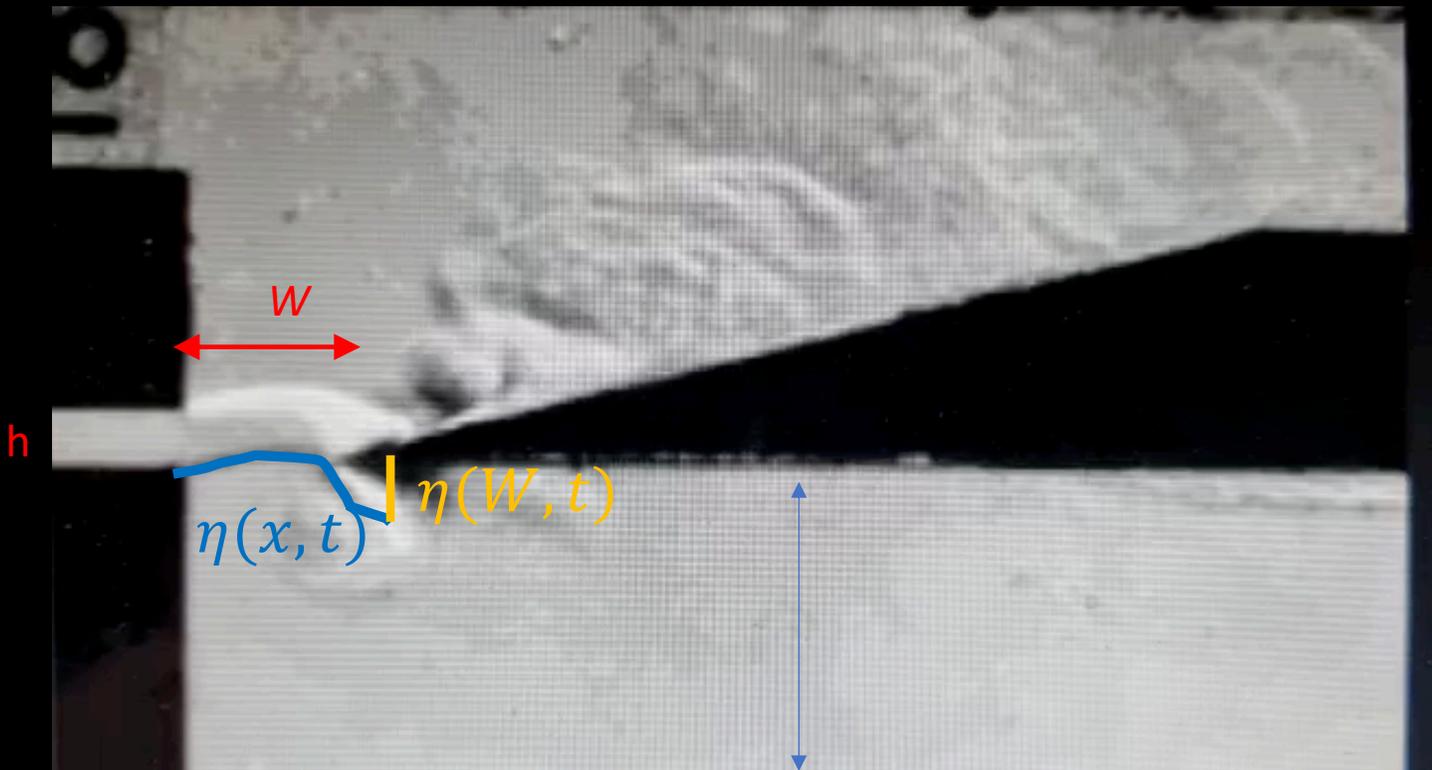
Esta ecuacion nos dice que son las fluctuaciones del flujo las que originaran el sonido

Empecemos por aca

$$\left(\frac{1}{c_0^2} \frac{\partial^2}{\partial t^2} - \nabla^2 \right) p = \rho_0 \frac{\partial q}{\partial t} - \nabla \cdot \mathbf{F}$$



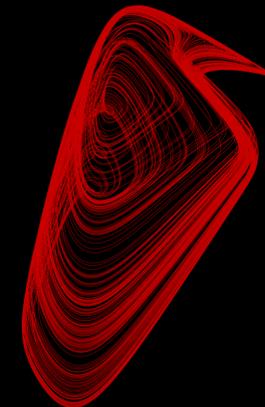
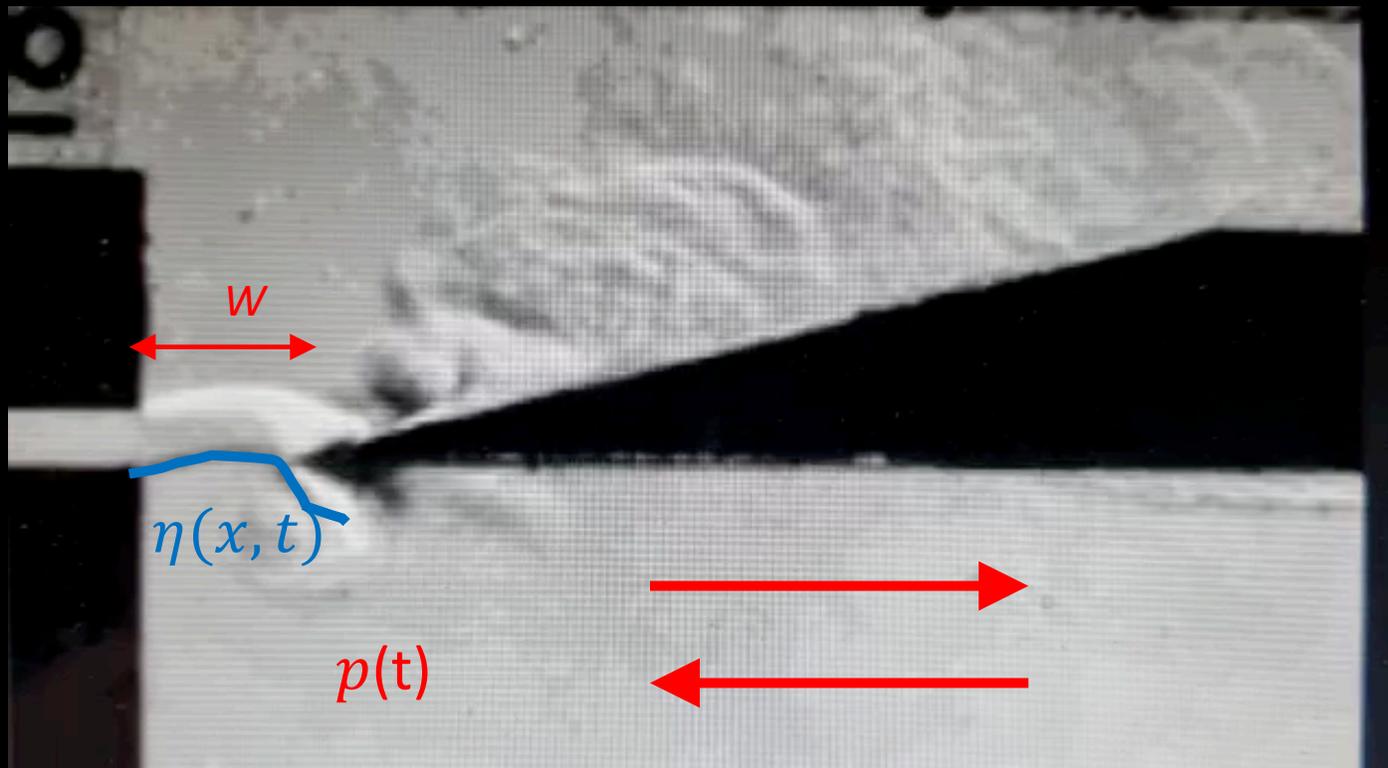
¿Y como calculamos ese flujo “q”?
Si sabemos como se deforma el jet
no es muy dificil:



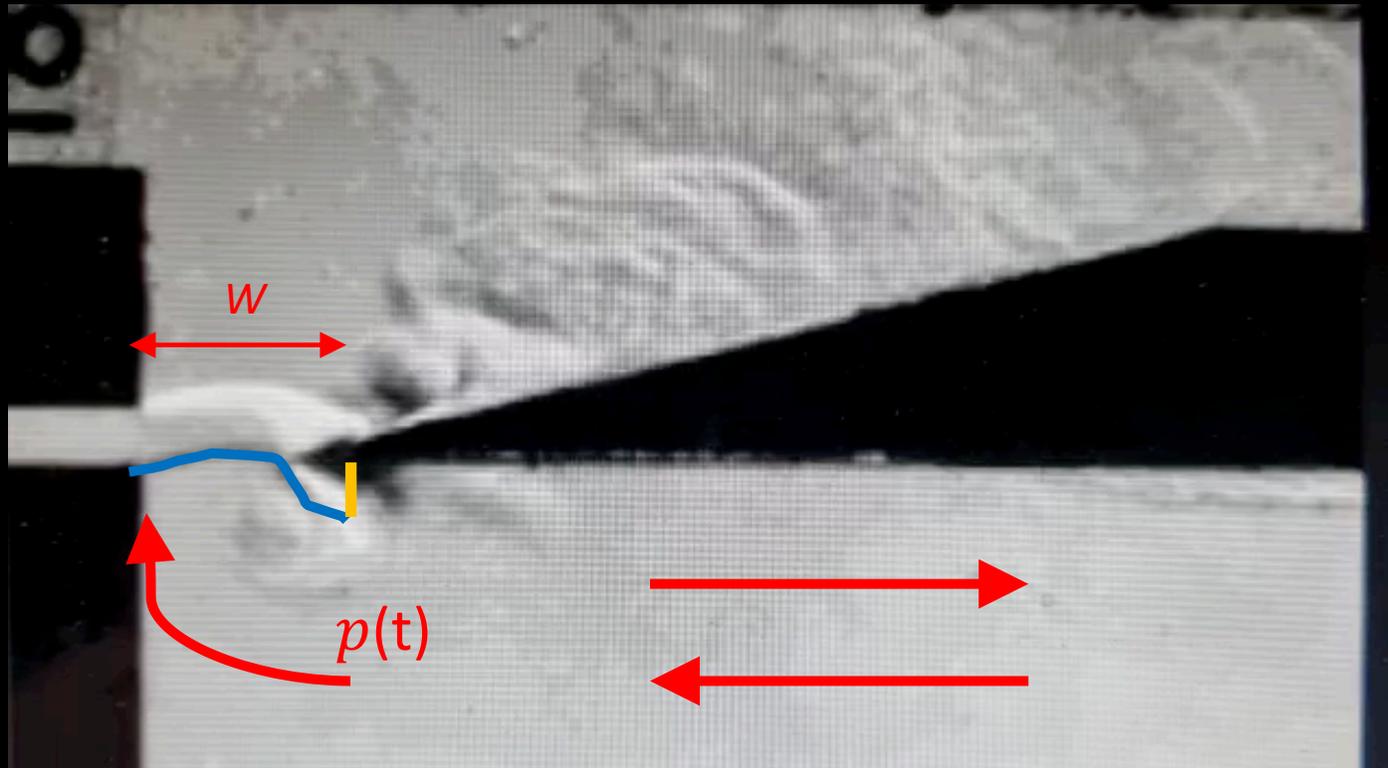
Con U el perfil de
velocidad del jet

$$q = \int_0^{L2} U(y - \eta(W, t)) dy$$

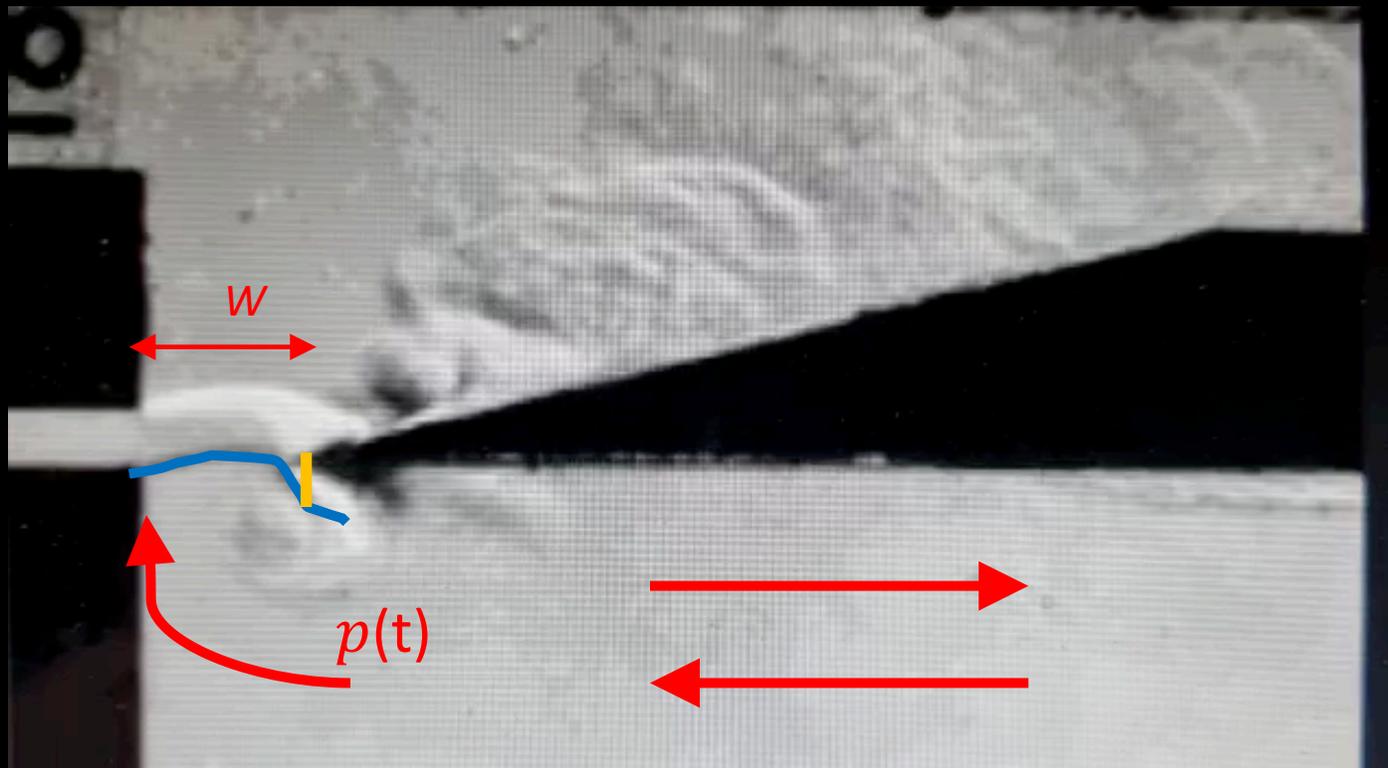
$$U(\alpha) = \begin{cases} 0, & \alpha > L2 \\ 1, & \alpha \in [L2, L2 + h] \\ 0, & \alpha < L2 \end{cases}$$



$$p = \# \frac{\partial q}{\partial t} + r p(t - 2T)$$



Y así tenemos en cuenta que la deformación al llegar al filo, fue originada por una fluctuación de la velocidad acústica (o sea de la presión), un tiempo W/c_p antes (c_p velocidad convectiva de viaje de perturbaciones en el jet)...



$$\eta(W, t) \propto p(t - W/c_p)$$

$$\eta(W, t) \propto p(t - W/c_p)$$

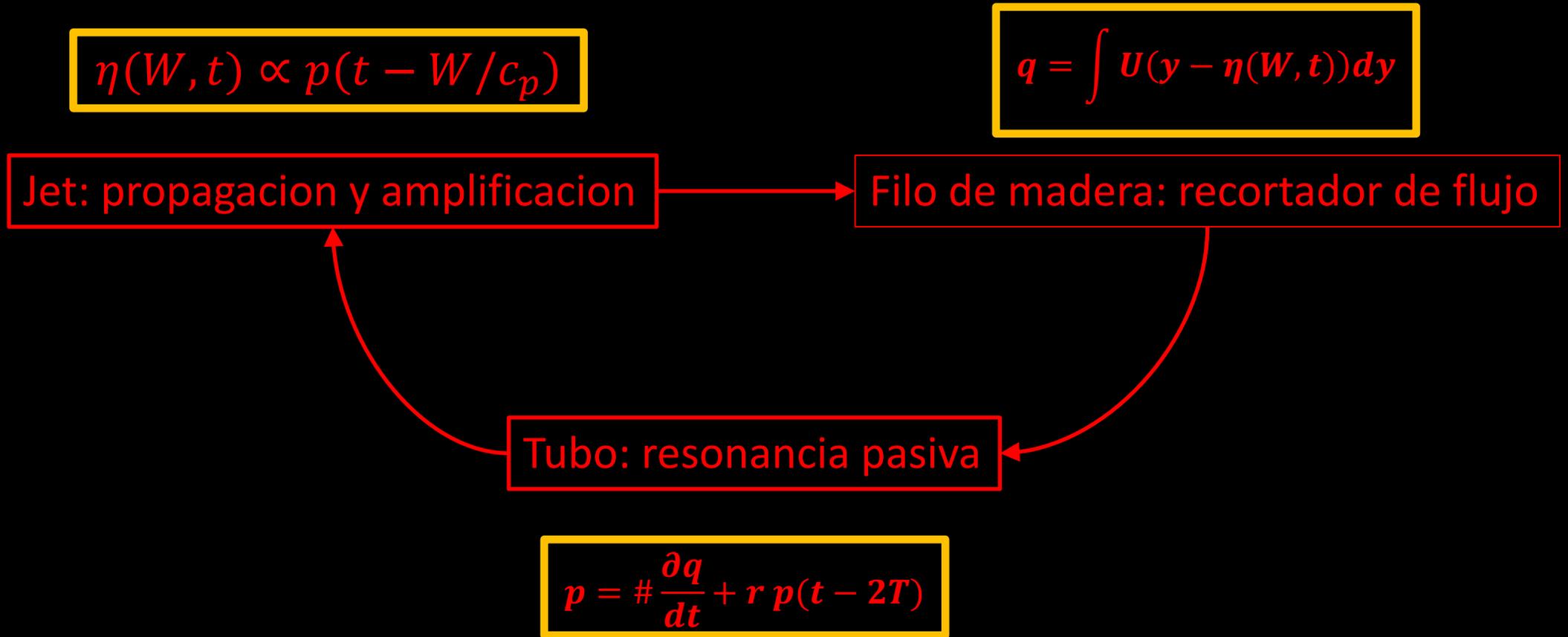
$$q = \int U(y - \eta(W, t)) dy$$

Jet: propagacion y amplificacion

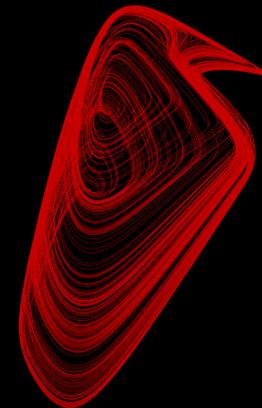
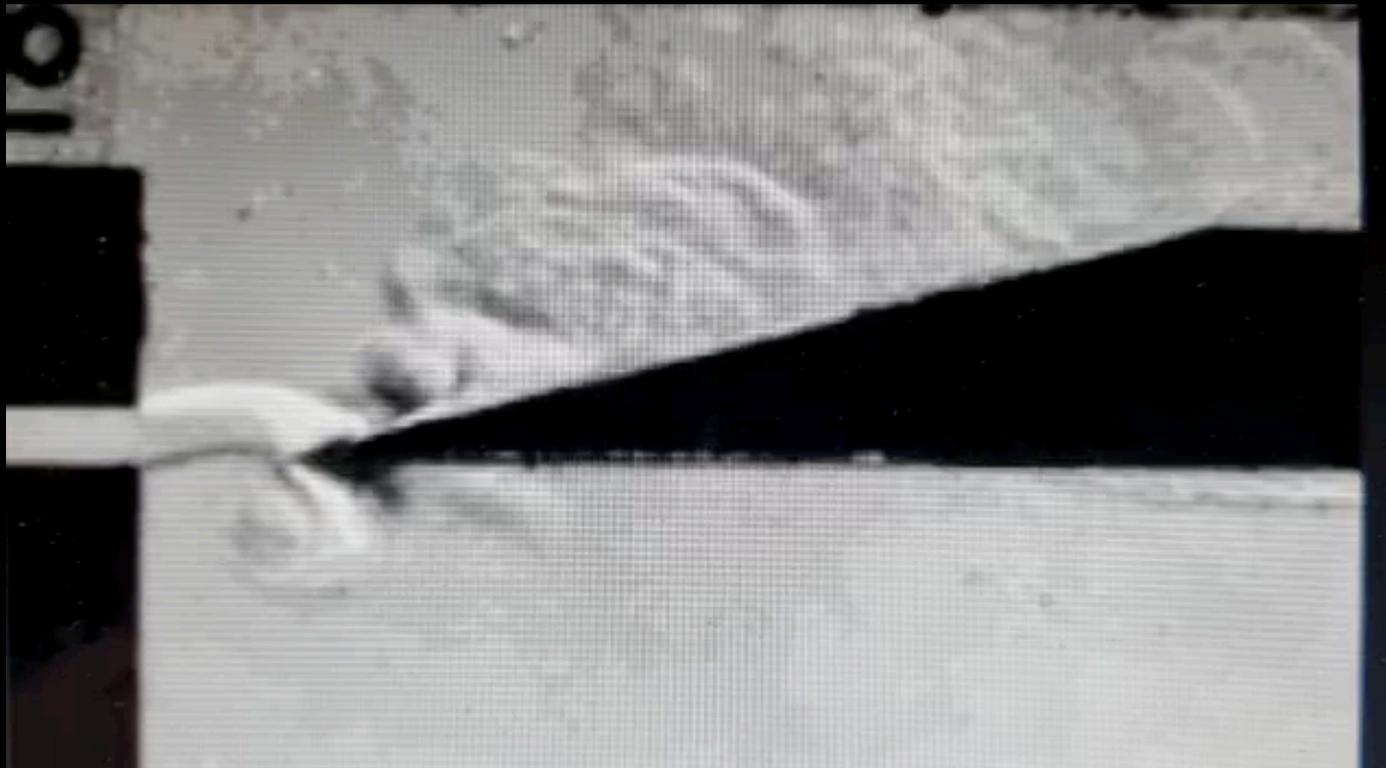
Filo de madera: recortador de flujo

Tubo: resonancia pasiva

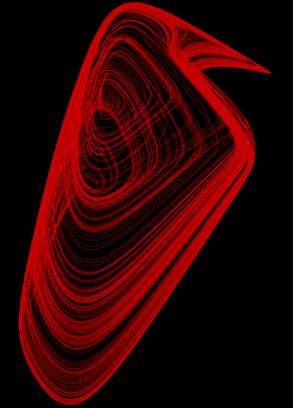
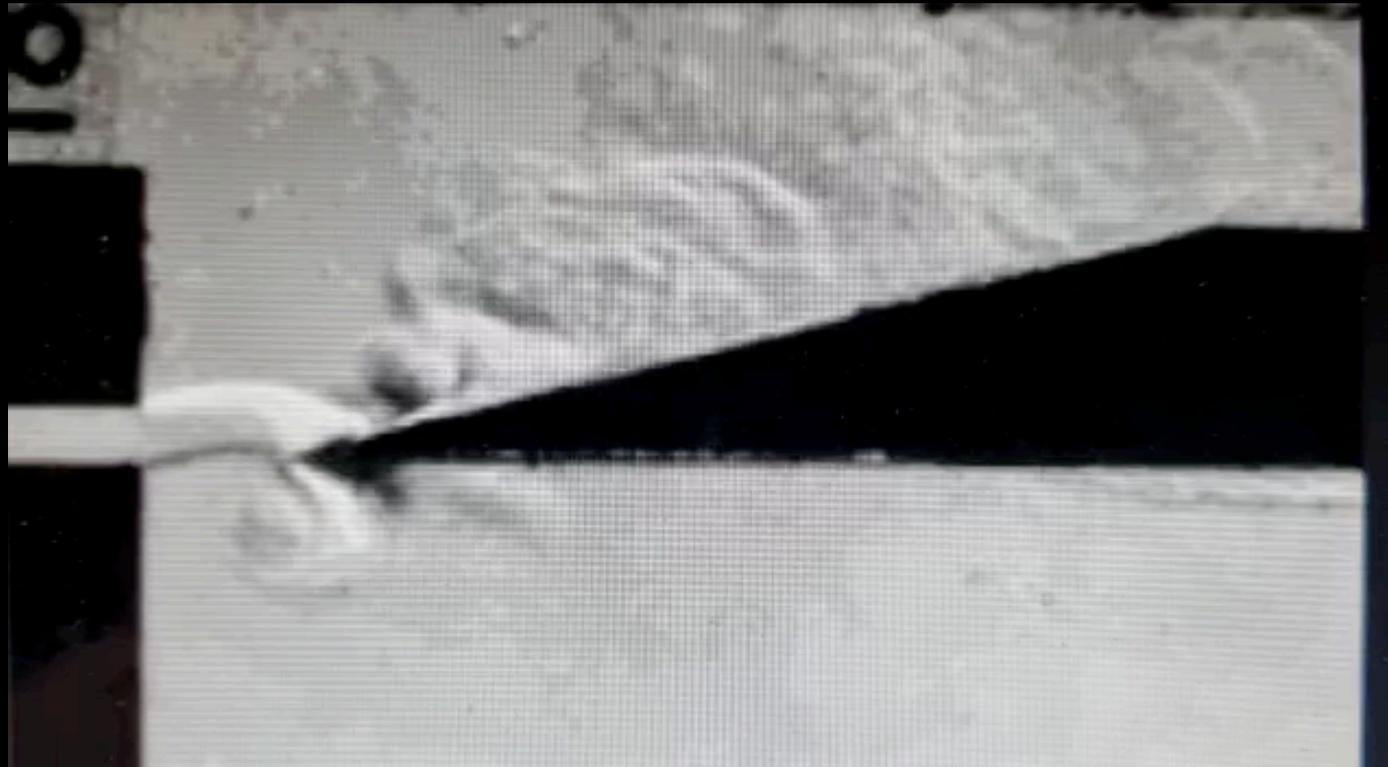
$$p = \# \frac{\partial q}{\partial t} + r p(t - 2T)$$



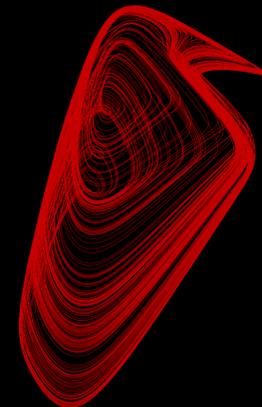
Mete energia por aca



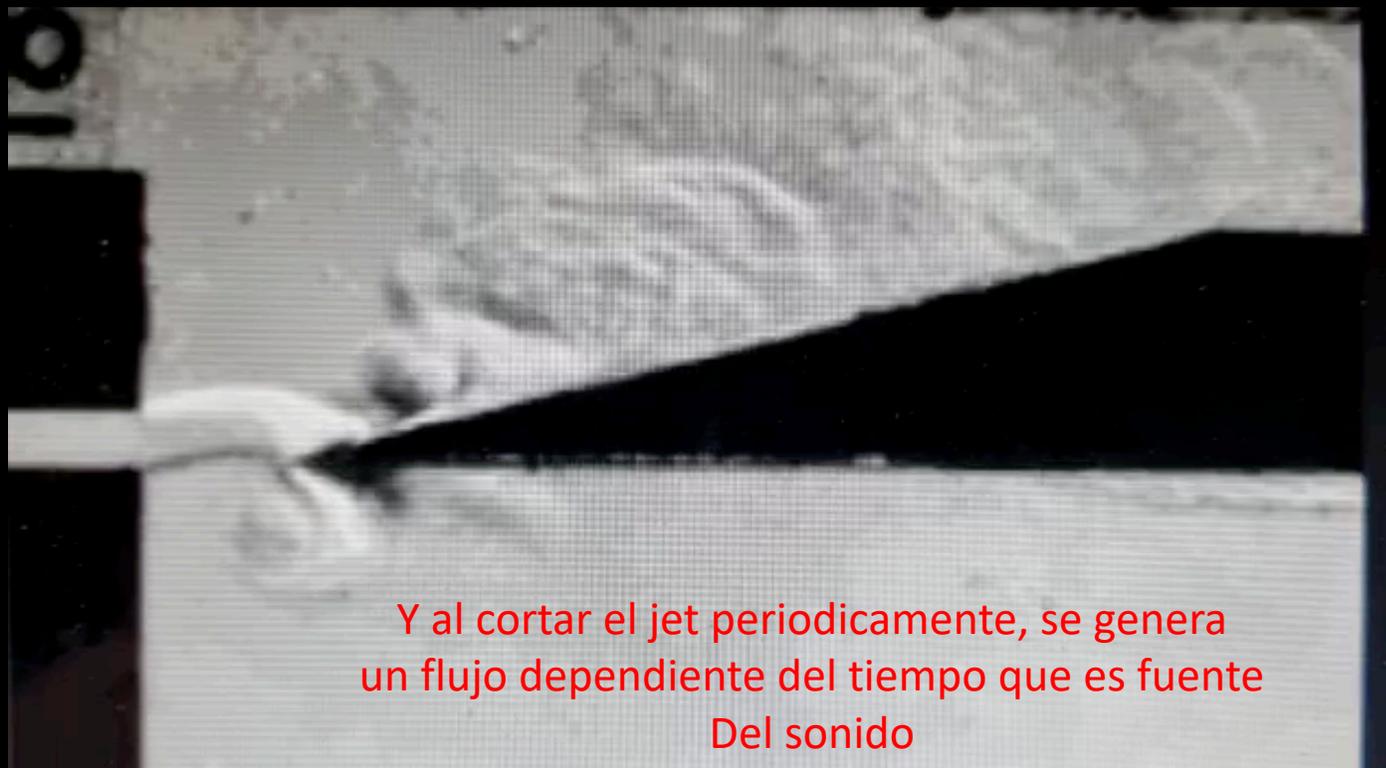
Mete energia por aca



Las resonancias del tubo seleccionan una frecuencia
Para desestabilizar al jet

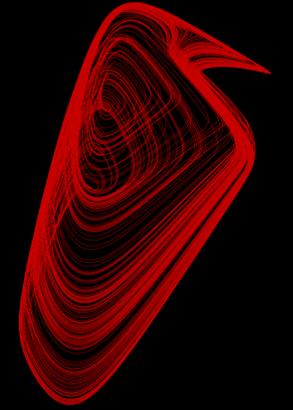
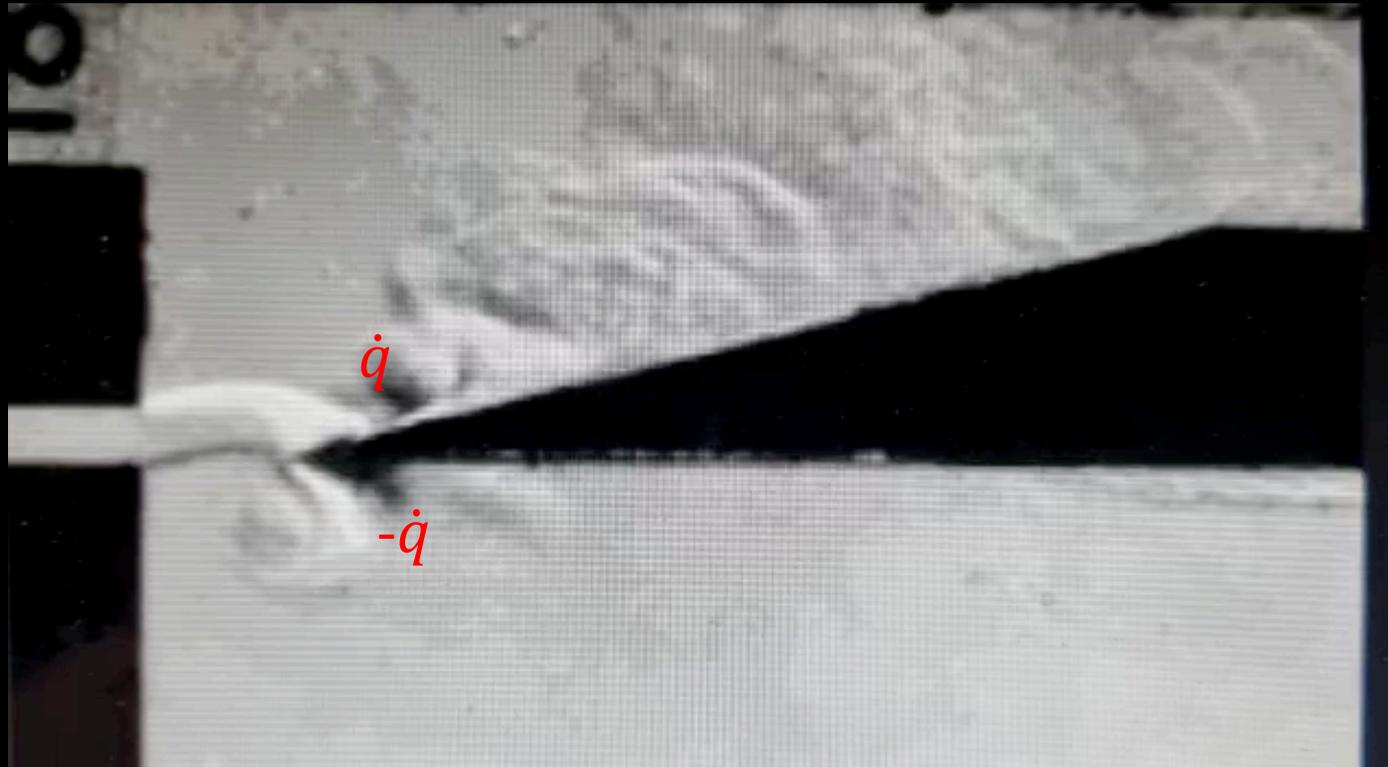


Mete energia por aca

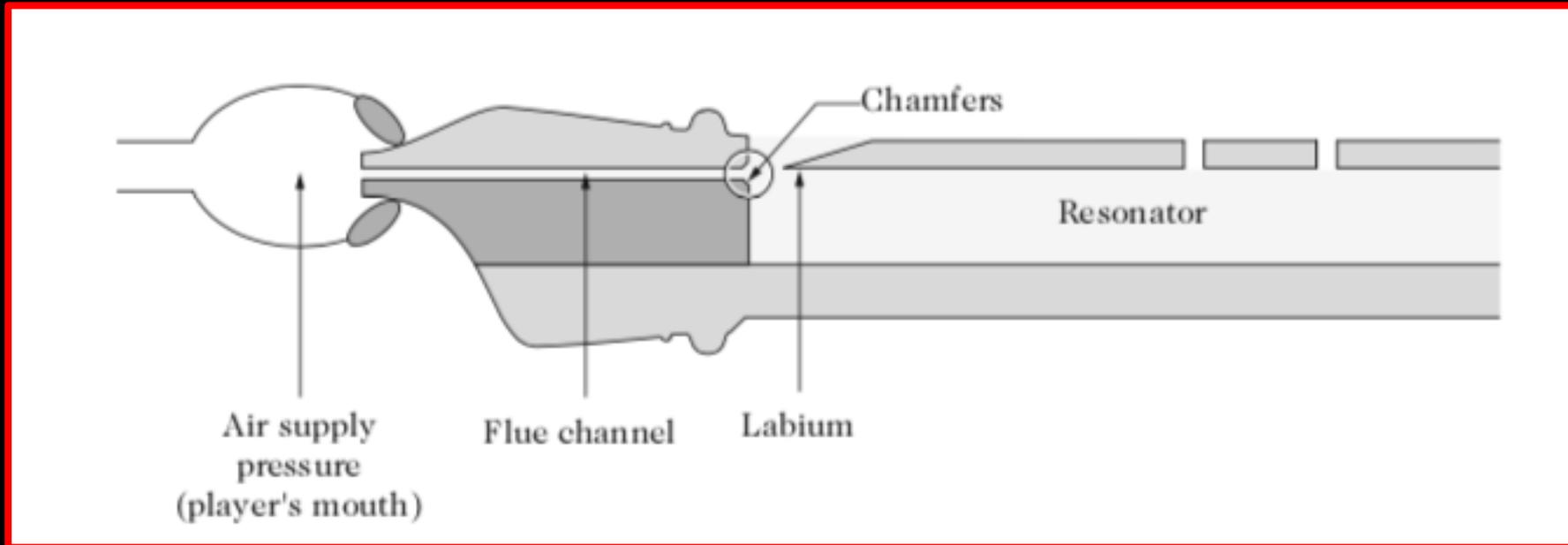


Y al cortar el jet periodicamente, se genera
un flujo dependiente del tiempo que es fuente
Del sonido

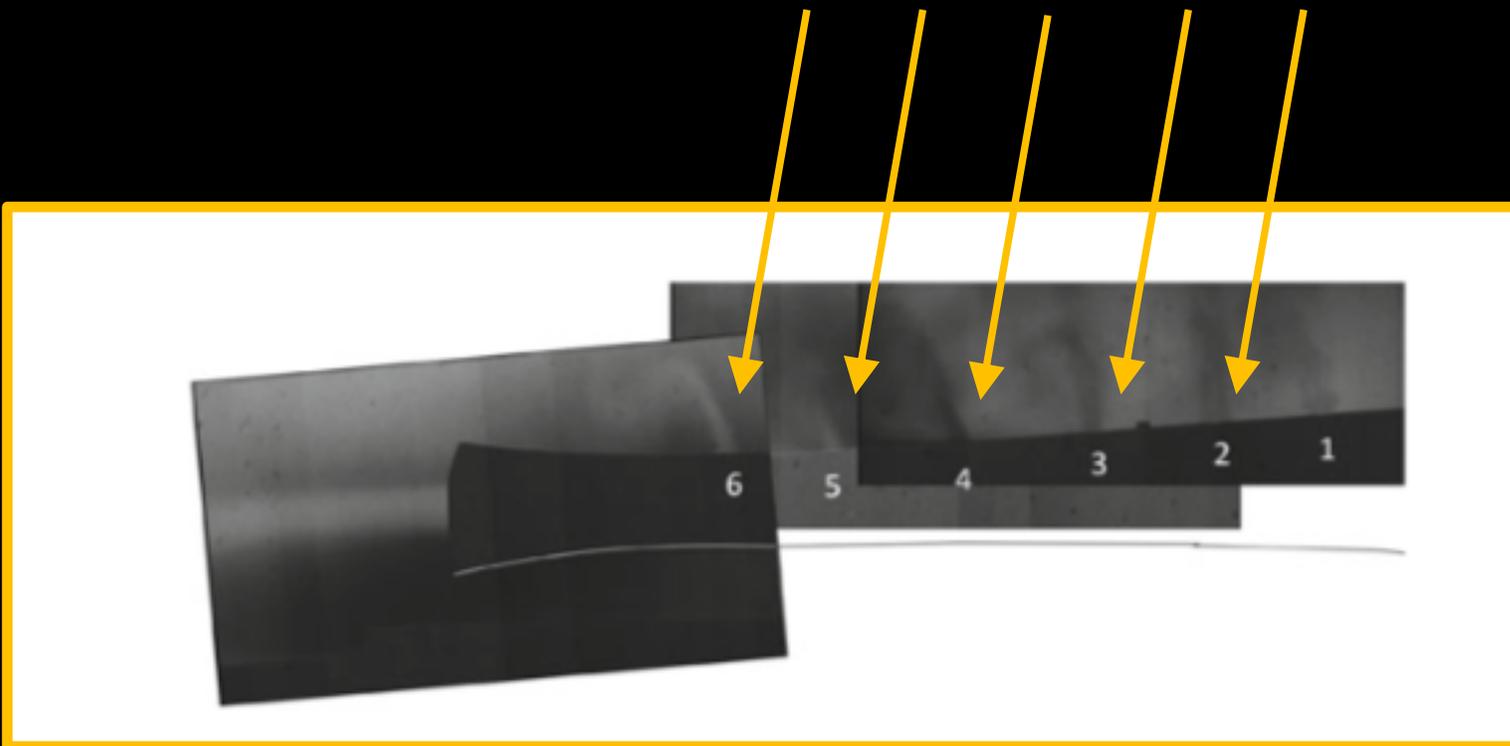
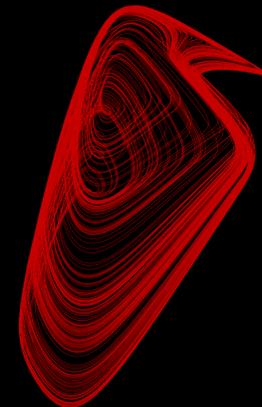
Las resonancias del tubo seleccionan una frecuencia
Para desestabilizar al jet



De hecho, se genera un dipolo
Podemos encontrar evidencia del mismo?

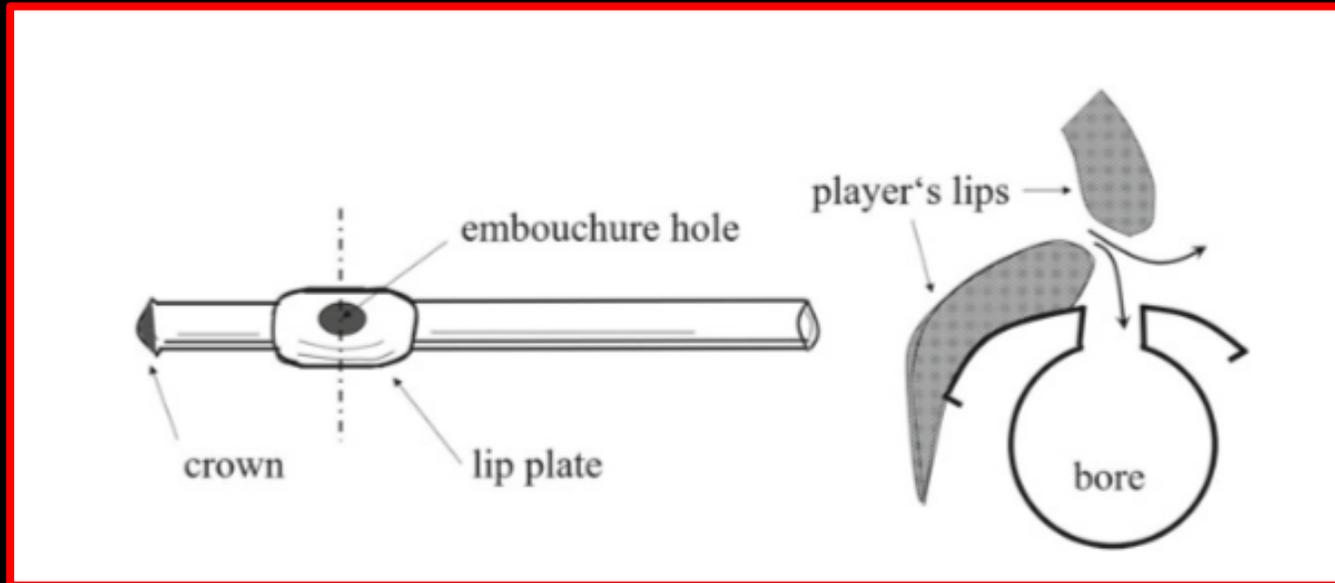
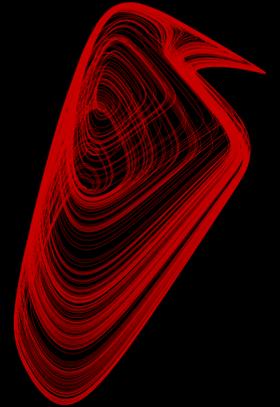


Una flauta dulce es básicamente un tubo abierto que, cuando se toca de forma normal, desarrolla una onda estacionaria entre el extremo abierto donde se sopla y el primer orificio abierto debajo de la boquilla.

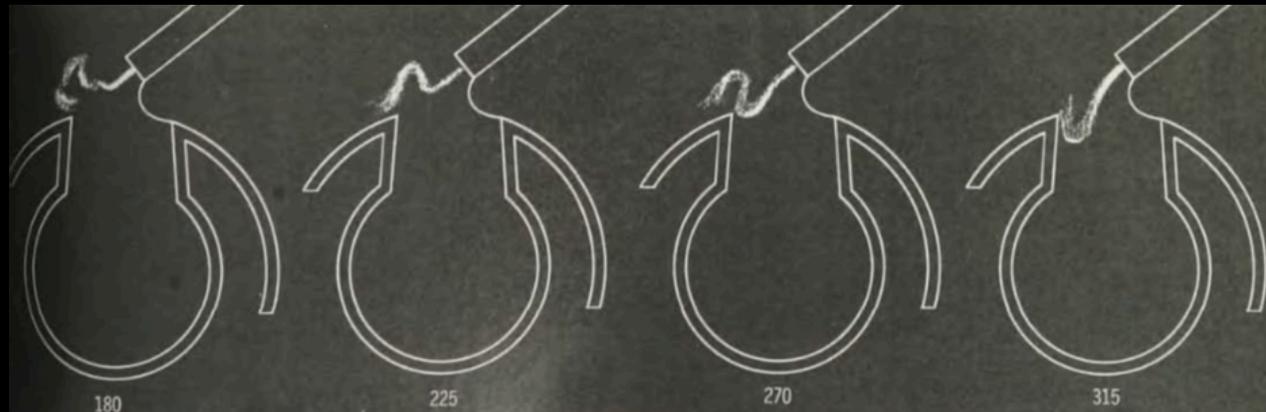
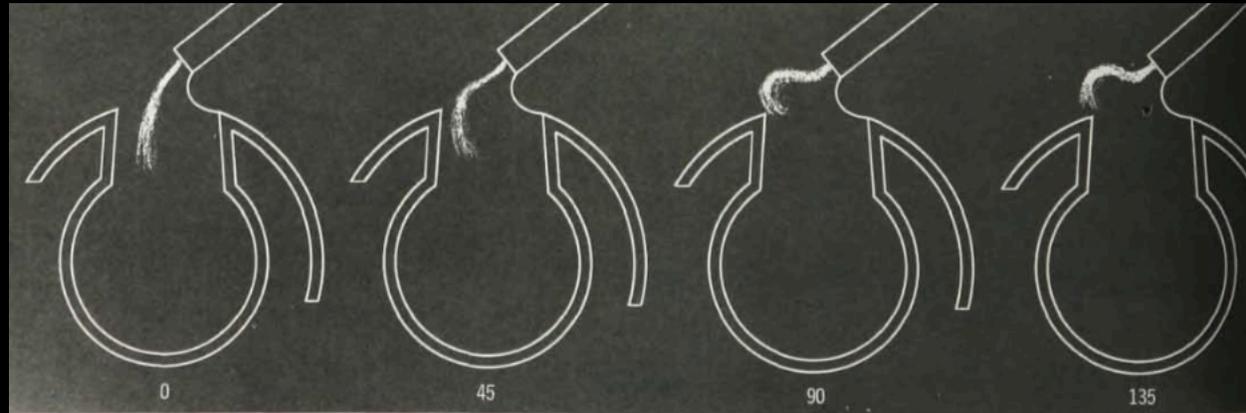


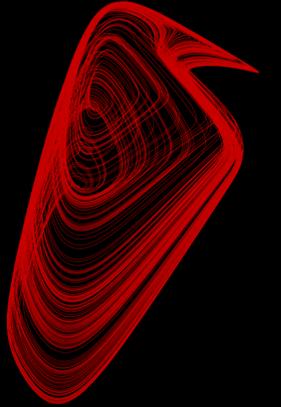
Nodos de presion, anti-nodos de desplazamiento

Una fisica parecida, en terminos de la **fuentes**

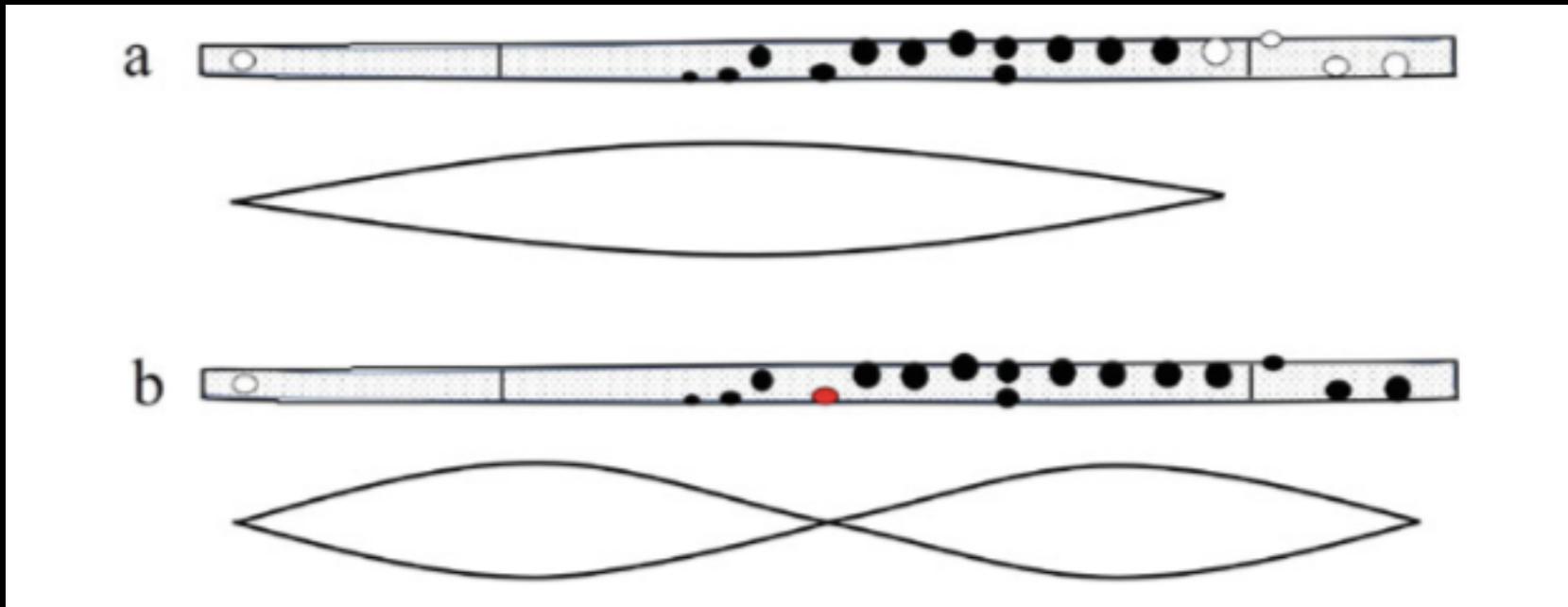


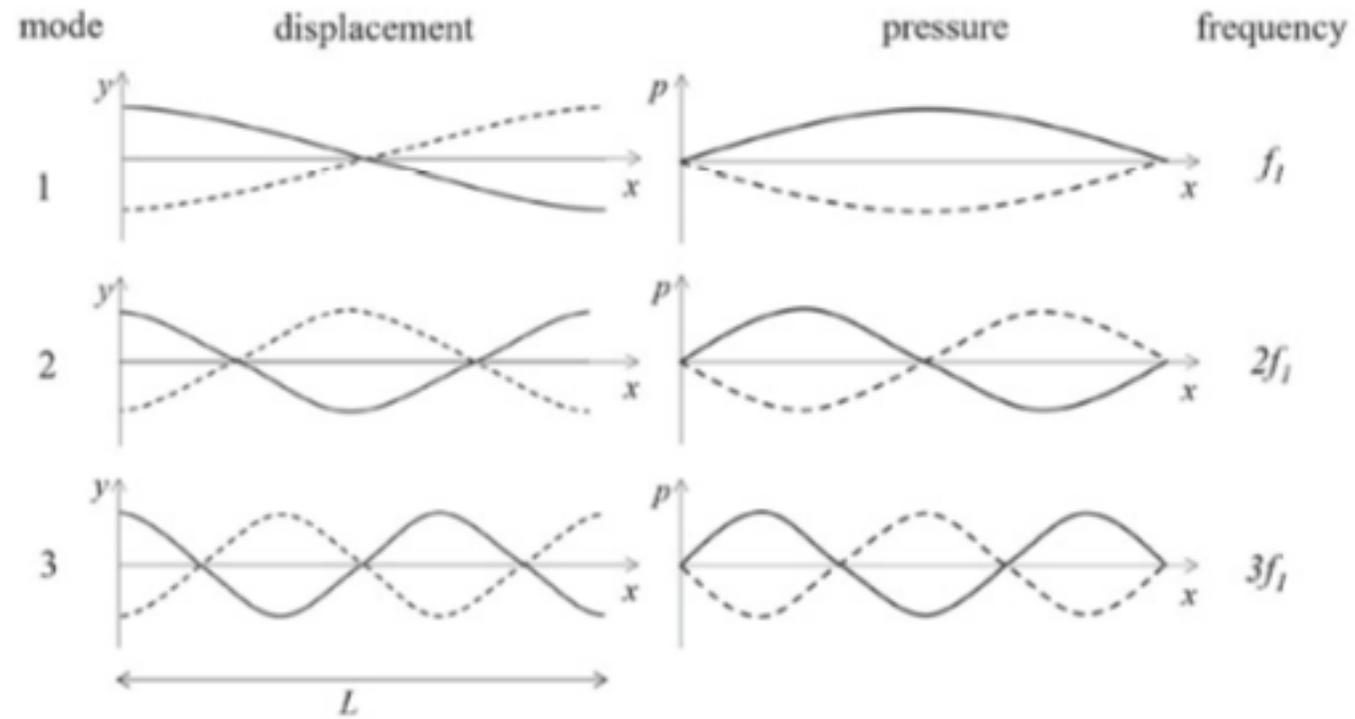
Oscilacion a 437 Hz, muestreo de cerca de 10 Hz



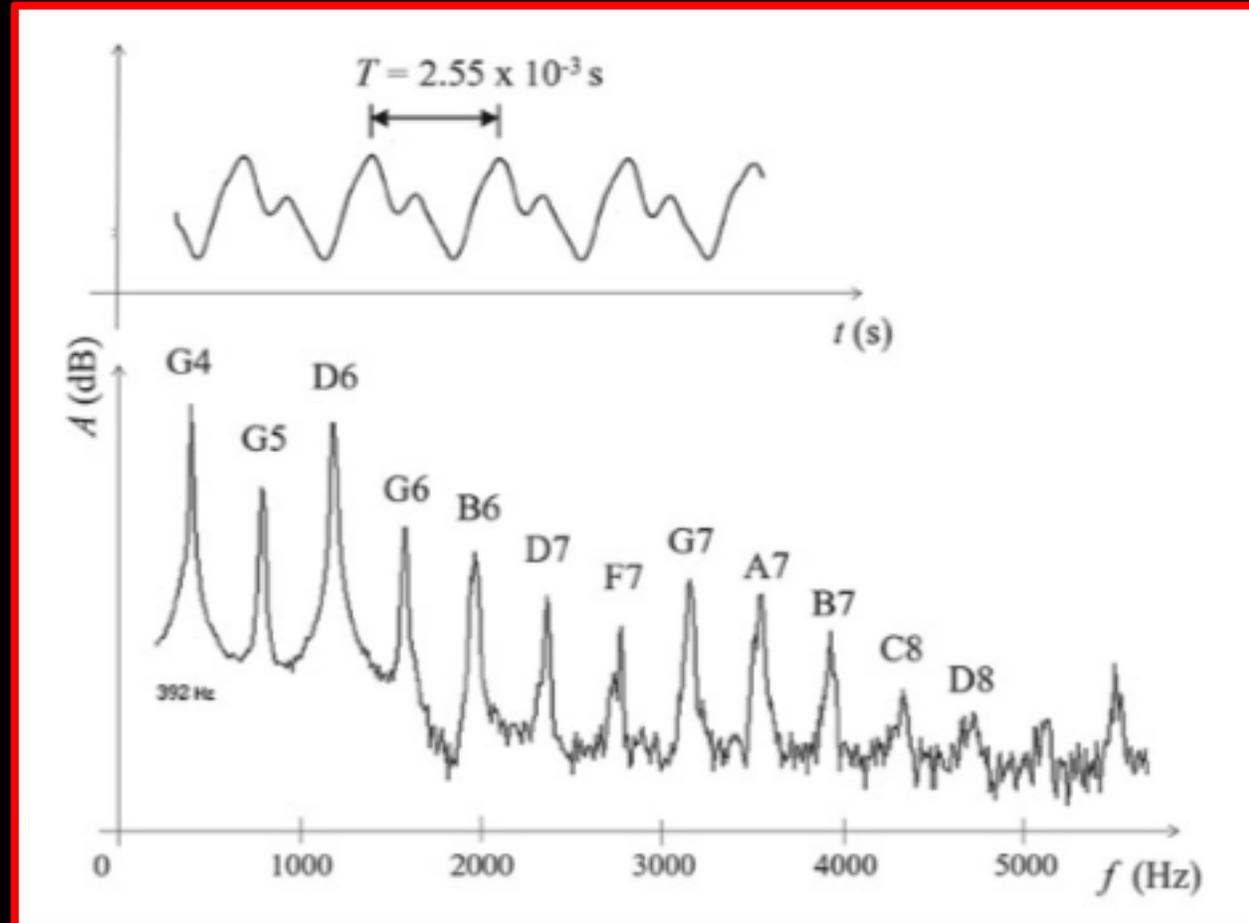


Pero el sistema resonador es abierto-abierto

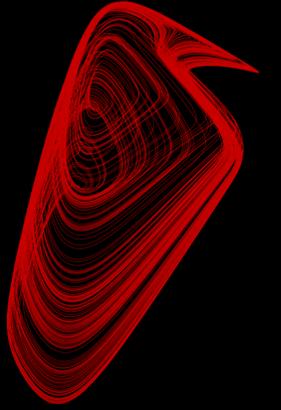


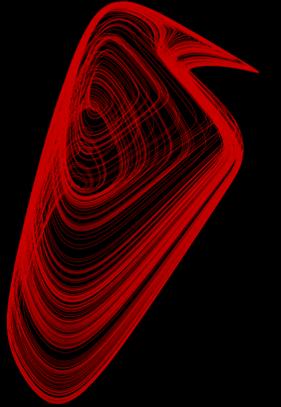


En la flauta traviesa
la fundamental es
marcadamente mayor
en todo el rango del
instrumento









DID NEANDERTHALS PLAY MUSIC? X-RAY COMPUTED MICRO-TOMOGRAPHY OF THE DIVJE BABE ‘FLUTE’*

C. TUNIZ,^{1,2} F. BERNARDINI,¹ I. TURK,³ L. DIMKAROSKI,⁴ L. MANCINI⁵
and D. DREOSI⁵

¹The ‘Abdus Salam’ International Centre for Theoretical Physics, Multidisciplinary Laboratory, II Strada Costiera, Trieste 34151, Italy

²Centre for Archaeological Science, University of Wollongong, NSW 2522, Australia

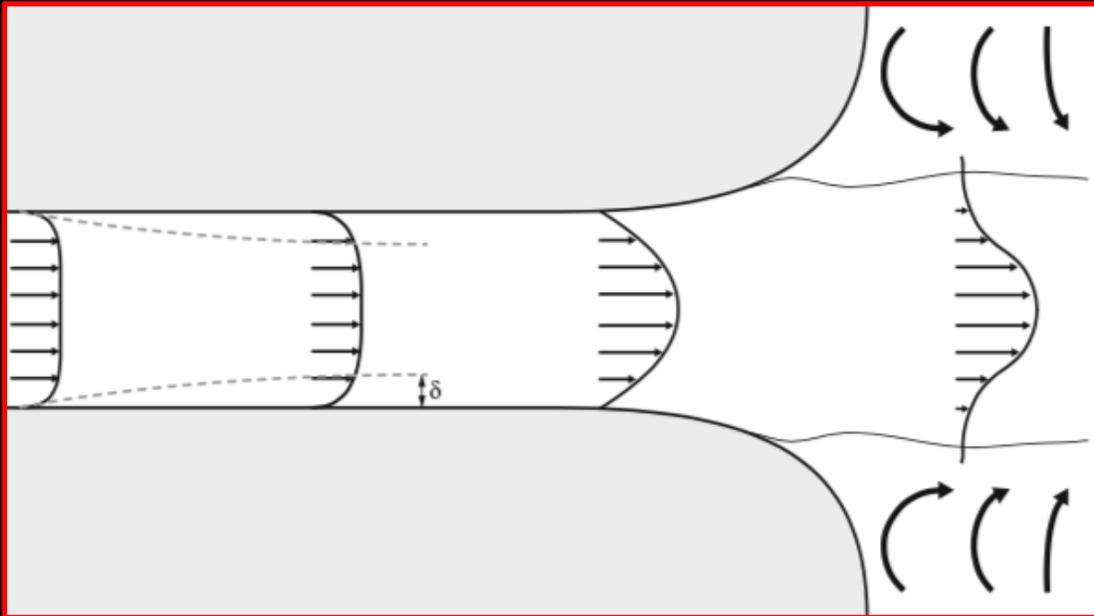
³Ex-research advisor of Institute of Archaeology SRC, Ljubljana 1000, Slovenia

⁴SNG Opera and Ballet, 5 Ljubejeva, Ljubljana 1000, Slovenia

⁵Elettra Sincrotrone Trieste, 14 Strada Statale, Trieste, Basovizza 34149, Italy

Archaeological evidence for wind musical instruments made by modern humans has been well established from the Upper Palaeolithic in Europe. Musical instruments evidently made by Neanderthals have not been found so far. The most controversial object is a juvenile cave bear femur with two complete holes, found in 1995 in the Middle Palaeolithic layers of the Cave Divje babe I, Slovenia. The bone was interpreted as a possible Neanderthal ‘flute’, but some scholars have firmly rejected this hypothesis on the basis of taphonomic observations, suggesting a carnivore origin for the holes. Here, we show the results of X-ray computed micro-tomography (mCT) performed on the Divje babe I ‘flute’. Our analyses demonstrate that there were originally four holes, possibly made with pointed stones and bone tools. Most surface modifications near the holes, previously interpreted as effects of carnivore gnawing, are post-depositional marks. Furthermore, a thin layer has been removed around one of the complete holes, producing a flat surface, possibly to facilitate perforation. The new data show that a Neanderthal manufacture of the object cannot be ruled out.

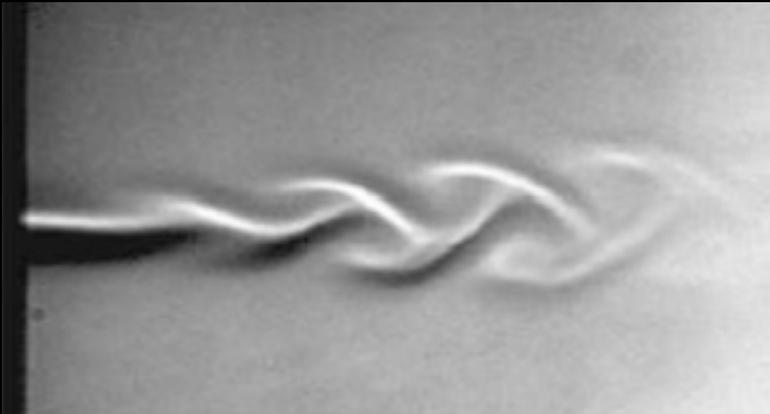
Temas adicionales



El calculo del perfil de velocidades,
tiene que tener en cuenta la viscosidad

$$\rho_0 \frac{d\mathbf{v}}{dt} = -\nabla p + \mu \nabla^2 \mathbf{v}$$

Temas adicionales



Inestabilidad de Rayleigh

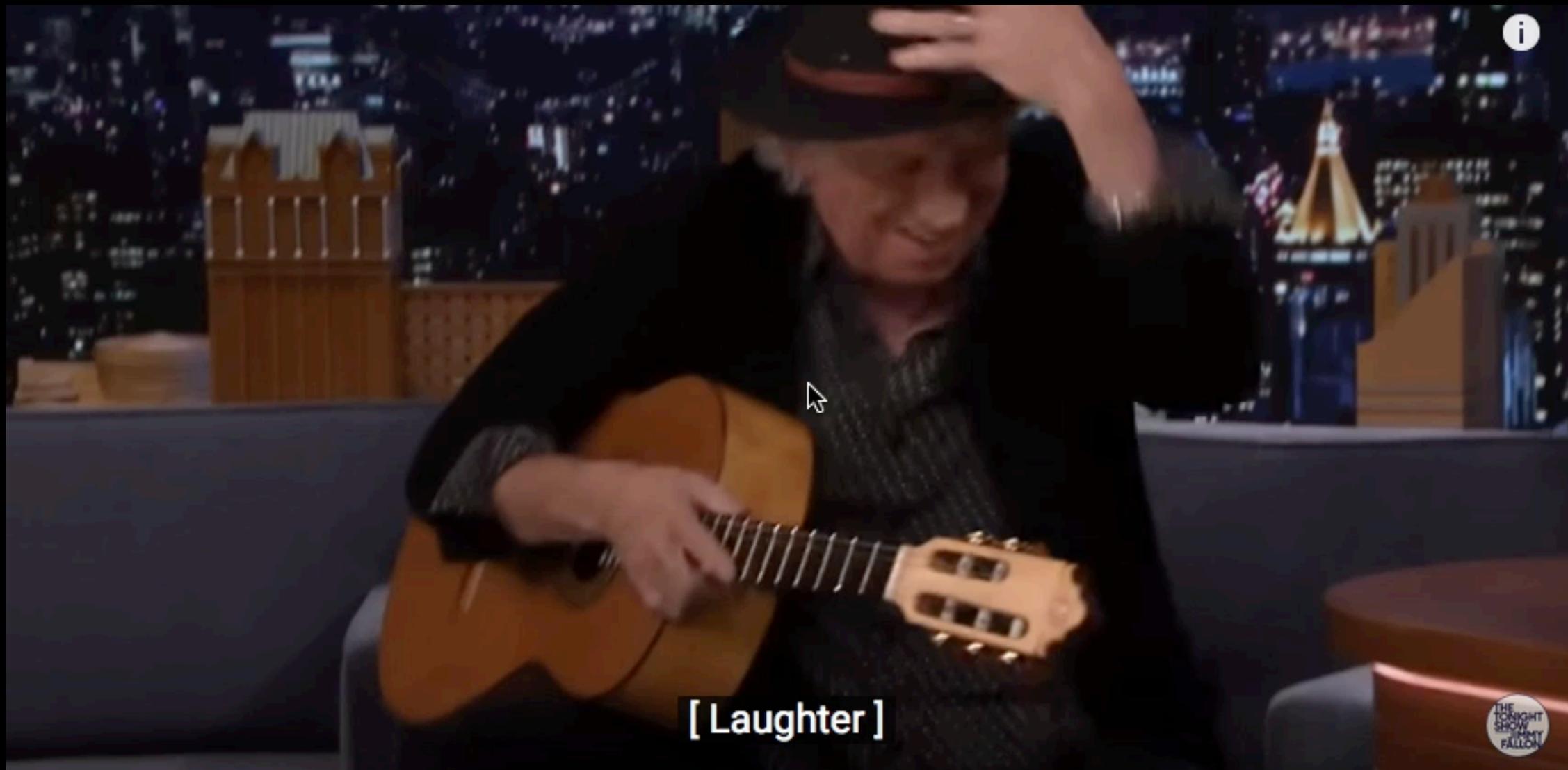
$$\frac{d\omega}{dt} = 0$$

Mas un desarrollo perturbativo



Chaigne y Kergomard

En esta clase solo mencionamos que las perturbaciones temporales a la entrada del Jet, se amplifican convectivamente



[Laughter]



¿Como le sacas a esa guitarra ese sonido?



Una buena pregunta es una que

1. nos hace colgar en el colectivo
2. nos deja pensando en la ducha
3. Se nos viene a la mente ante una conversacion aburrida

Las malas preguntas tambien llevan tiempo, asi que elijan una buena pregunta. Una que les interese.

Elegida la pregunta, hagan el duelo rapidamente:
generalmente uno no puede contestar rapidamente
una buena pregunta. Una buena pregunta, bien planteada,
puede llevar unos dos o tres años ser resuelta.

Formulense una pregunta que los acerque en la direccion
De responder la pregunta original. Por ejemplo, en este caso:

1. Si son “experimentales”. Grábense (si tocan la guitarra) tratando de Reproducir ese timbre, analicen los espectros, compárenlos con los que se obtienen al pulsar las cuerdas.
2. Si les gustan los modelos y el análisis. Vuelvan a las clases de timbre y cuerdas pulsadas y golpeadas, y comparen los espectros con los que Keith logra con su guitarra.
3. Si les gustan las ecuaciones. Busquen bibliografía. Como.



Articles

About 19,200 results (0.19 sec)

Any time

[Since 2023](#)[Since 2022](#)[Since 2019](#)[Custom range...](#)

Sort by relevance

[Sort by date](#)

Any type

[Review articles](#) include patents include citations Create alertShowing results for **timbre guitar acoustic vs electric**Search instead for [timbre guitar acoustic vrs electric](#)**A digital filtering approach to obtain a more acoustic timbre for an electric guitar**[\[PDF\] eurasip.org](#)[H Penttinen, V Välimäki...](#) - 2000 10th European ..., 2000 - [ieeexplore.ieee.org](#)... in the **acoustic guitar** is relatively linear ... **acoustic** response from the **electric guitar**. In this study the discussion and development of obtaining a more **acoustic timbre** for an **electric guitar** ...[☆ Save](#) [🔗 Cite](#) [Cited by 10](#) [Related articles](#) [All 9 versions](#)**[PDF] More acoustic sounding timbre from guitar pickups**[\[PDF\] psu.edu](#)[M Karjalainen, H Penttinen, V Välimäki](#) - [impulse](#), 1999 - [Citeseer](#)... Two fundamentally different estimation techniques were used in this study for making the **electric guitar** sound more **acoustic**. In the first method we tried to use an equalizer that was ...[☆ Save](#) [🔗 Cite](#) [Cited by 17](#) [Related articles](#) [All 8 versions](#) [🔗](#)**Electric guitar-A blank canvas for timbre and tone**[\[PDF\] aip.org](#)[AU Case, A Roginska, JD Mathew...](#) - ... of Meetings on **Acoustics**, 2013 - [pubs.aip.org](#)... The sound of the **electric guitar** as realized in sound recordings might be born of simple ... **electric guitar** might be thought of as a system that is part mechanical, part **electrical**, part **acoustic**...[☆ Save](#) [🔗 Cite](#) [Cited by 2](#) [Related articles](#) [All 6 versions](#)



American Journal of Physics

[HOME](#) [BROWSE](#) [COLLECTIONS](#) [PUBLISH WITH US](#) [ABOUT](#) [MORE FROM AAPT](#)



CURRENT ISSUE

Volume 91, Issue 11, November 2023

[VIEW THIS ISSUE](#)

Focus and Coverage

The American Journal of Physics publishes papers that will support, inform, and delight a diverse audience of college and university physics teachers. Contents include novel approaches to classroom and laboratory instruction, insightful articles on topics in classical and modern physics, apparatus notes, historical or cultural topics, book reviews, resource letters, and award talks.

[Read more about the journal](#)

Editor

[Beth Parks](#)

[More About AJP](#)

RSS Feed

[Current Issue](#)



American Journal of Physics

- HOME
- BROWSE
- COLLECTIONS
- PUBLISH WITH US
- ABOUT
- MORE FROM AAPT

Update Search

guitar timbre

Filter All

ADD TERM

UPDATE

Format

Journal Articles (5)

Topics

AIP thesaurus

- Acoustics
- Biological physics
- Education

1-5 of 5 Search Results for

guitar timbre

Save search

Sort by Relevancy

JOURNAL ARTICLES

Inharmonicity in plucked guitar strings

[Chris J. Murray](#), [Scott B. Whitfield](#)

Journal: [American Journal of Physics](#)

Am. J. Phys. 90, 487–493 (2022)

<https://doi.org/10.1119/5.0064373>

Published: July 2022

...Chris J. Murray; Scott B. Whitfield We have considered the vibration of various types of pinned guitar strings and have investigated the deviation of the partials from integer multiples of the string's fundamental vibration frequency. We measured the inharmonicity parameter B and compared...

Avanzar una página (⌘→)
Descolgar para mostrar historial

https://sci-hub.se



sci-hub

<https://doi.org/10.1119/1.4832195> [open](#)

to remove all barriers in the way of science

[database](#) [about](#) [Elbakyan](#) [stats](#) [donate](#)

language [English](#) [简体中文](#) [Русский](#) [Português](#)

mirrors [sci-hub.se](#) [sci-hub.st](#) [sci-hub.ru](#) [see all](#) →

latest reads

21:46:10 Abdominal ultrasound / Gut Walmsley, 1988



AMERICAN
JOURNAL
of PHYSICS

An experimental analysis of a vibrating guitar string using high-speed photography

Scott B. Whitfield and Kurt B. Flesch

Citation: [American Journal of Physics](#) **82**, 102 (2014); doi: 10.1119/1.4832195

View online: <http://dx.doi.org/10.1119/1.4832195>

View Table of Contents: <http://scitation.aip.org/content/aapt/journal/ajp/82/2?ver=pdfcov>

Published by the [American Association of Physics Teachers](#)

Articles you may be interested in

[Guitars, Keyboards, Strobes, and Motors — From Vibrational Motion to Active Research](#)

[Phys. Teach.](#) **51**, 35 (2013); 10.1119/1.4772036

[Vibrational behavior of a soundbox in an atmosphere with a variable speed of sound](#)

[J. Acoust. Soc. Am.](#) **131**, 2495 (2012); 10.1121/1.3677250

[Hydromonochord: Visualizing String Vibration by Water Swirls](#)

[Phys. Teach.](#) **48**, 370 (2010); 10.1119/1.3479710

Pero no olviden LA pregunta.

