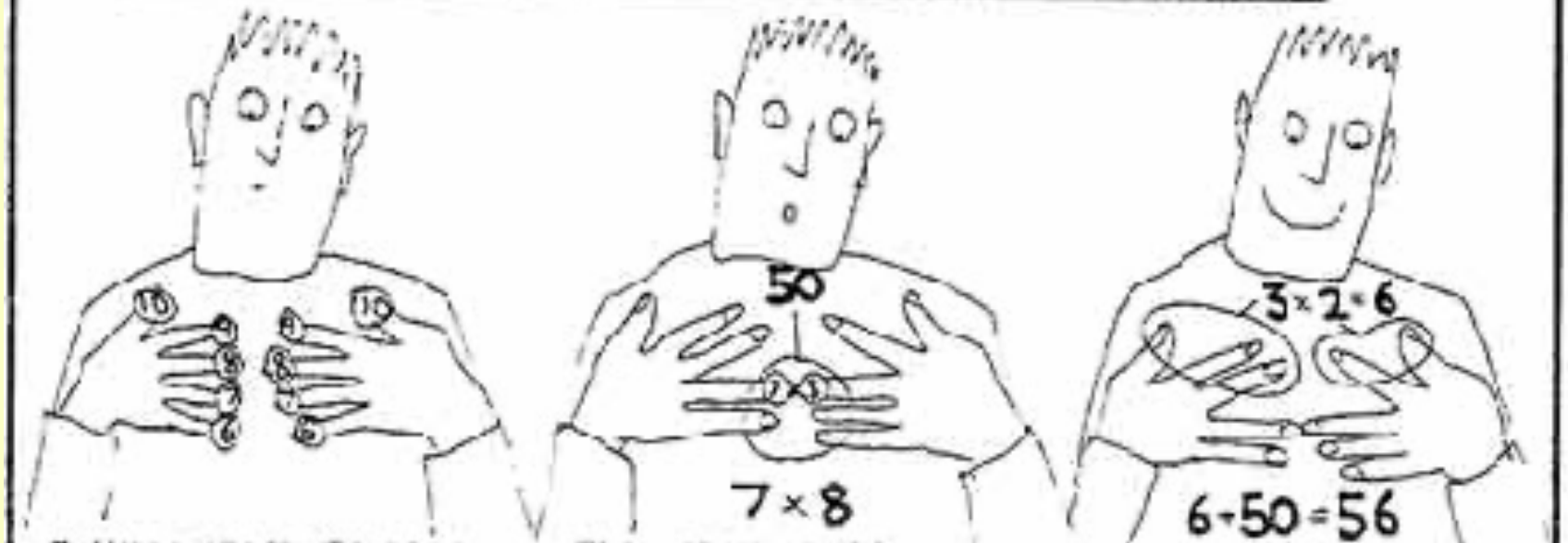
IES MELIDE

Semana das Matemáticas

10 - 14 de marzo 2008

MULTIPLICATION

HOW TO DO RUSSIAN MULTIPLICATION



RUSSIAN PEASANTS ARE SAID TO HAVE USED THIS METHOD FOR MULTIPLYING NUMBERS BETWEEN 6 & 10. THE FINGERS ARE MENTALLY NUMBERED FROM 6 TO 10 AS ABOVE. ANY PAIR OF NUMBERS CAN THEN BE MULTIPLIED AS IN THIS EXAMPLE.

TO MULTIPLY 7 BY 8 THE TIP OF EITHER 7 FINGER IS PLACED AGAINST THE TIP OF AN 8 FINGER ON THE OTHER HAND. THE TOUCHING FINGERS PLUS ALL THE FINGERS BELOW THEM ON BOTH HANDS REPRESENT THE '10's (i.e. 50).

NOW MULTIPLY THE NUMBER OF REMAINING FINGERS ON THE LEFT HAND BY THE NUMBER OF REMAINING FINGERS ON THE RIGHT (i.e. 3×2 = 6). ADD THIS TO THE TENS OBTAINED PREVIOUSLY (50) TO GET THE FINAL ANSWER.

ARITMÉTICA

- LEITURA_DO_PENSAMENTO

- Un número grande: o “googol”, nome inventado en 1920 polo sobriño dun matemático
- 10,000,000,000,000,000,000,000,000,000,000,00
0,000,000,000,000,000,000,000,000,000,000,000
,000,000,000,000,000,000,000,000,000,000,
000,000,000

Ecuacións

- X^3+y^3+z^3 = 29
- Ten solución x=3, y=1, z=1

Ecuacións

- x^3+y^3+z^3 = 30
- Ten solución
- X=-283059965
- Y=-2218888517
- Z=2220422932
- (descuberta en 1999)

Ecuacións

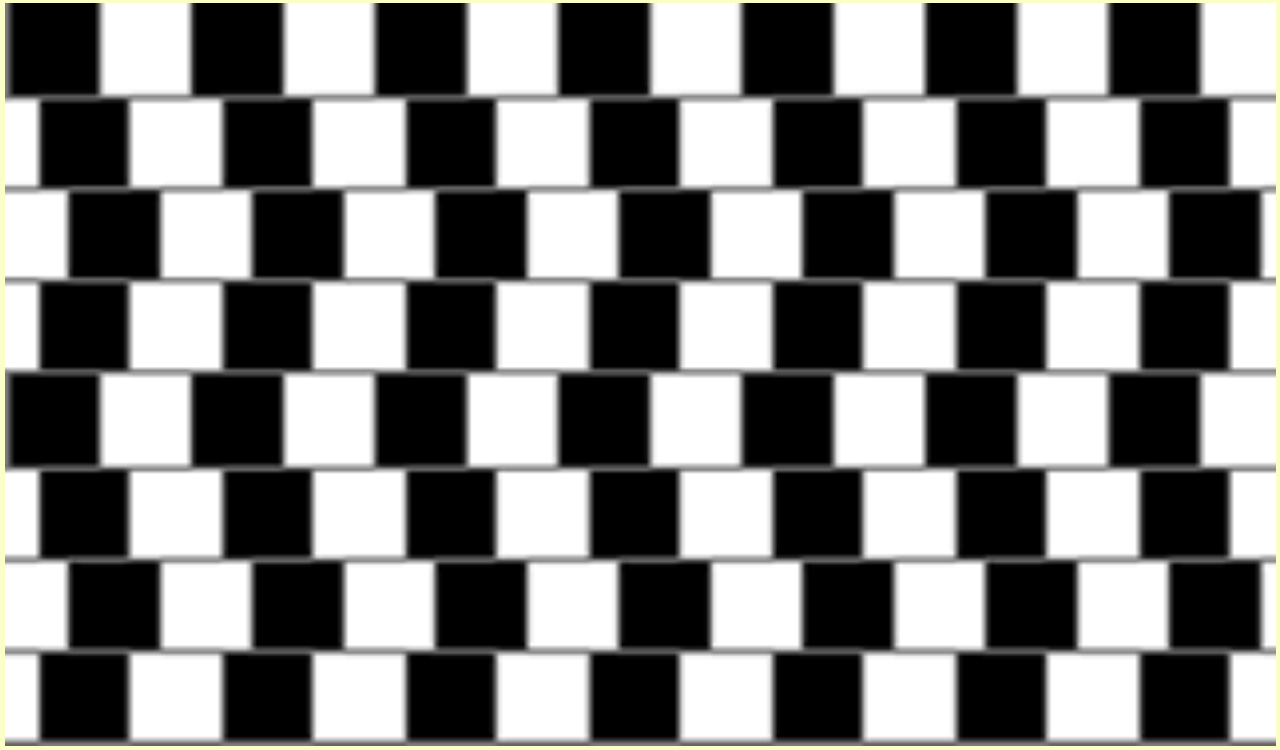
- x^3+y^3+z^3 = 33
- Non se sabe resolver!

XEOMETRÍA

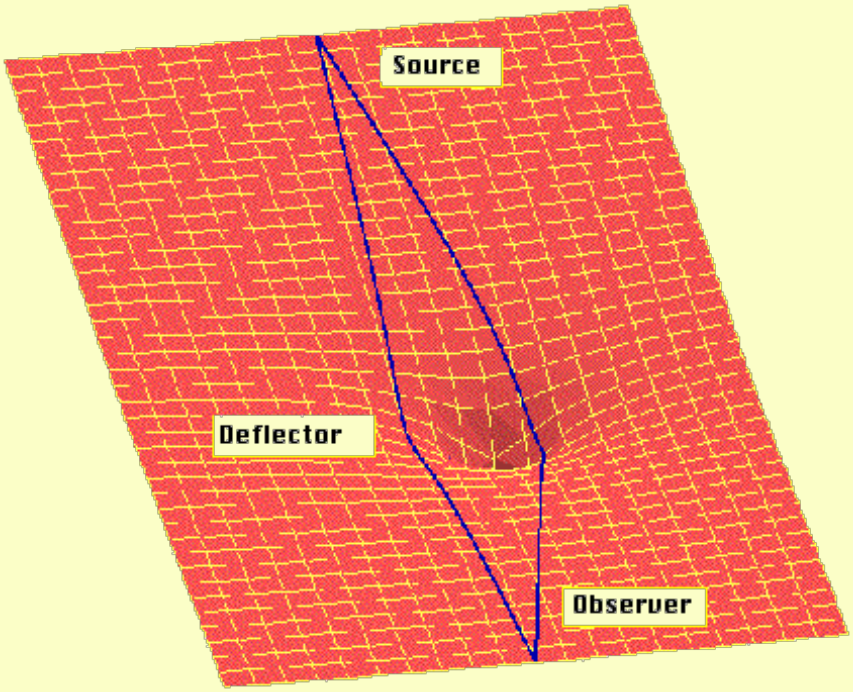
- O V postulado de Euclides

Por un punto exterior a una recta só cabe trazar unha paralela (Tolomeo).

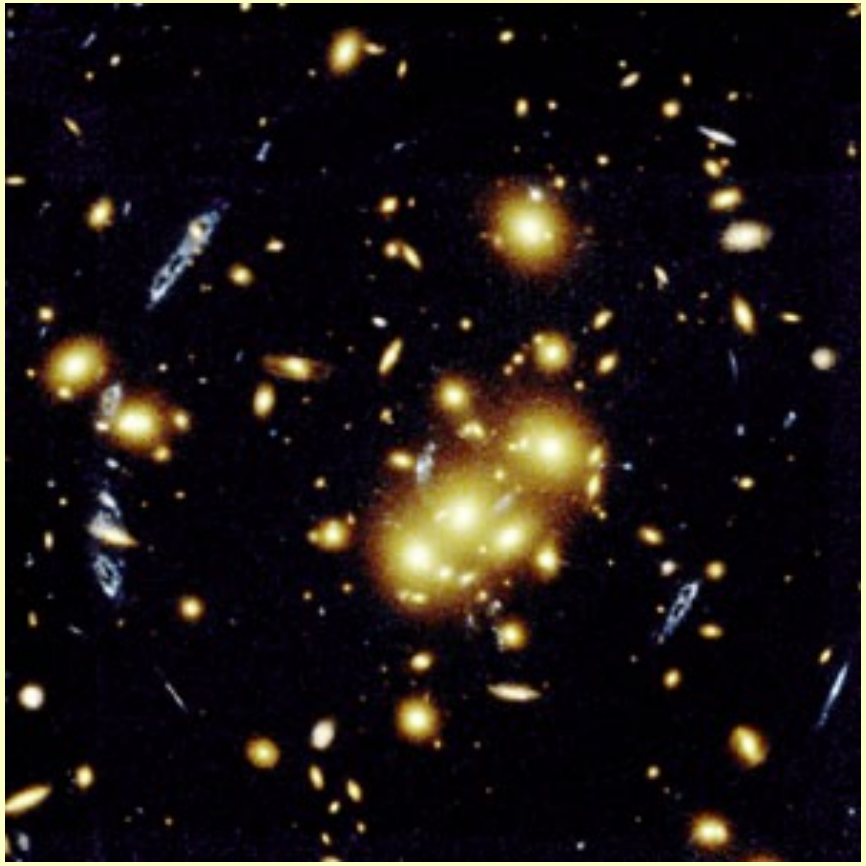
Paralelas



Lente gravitatoria



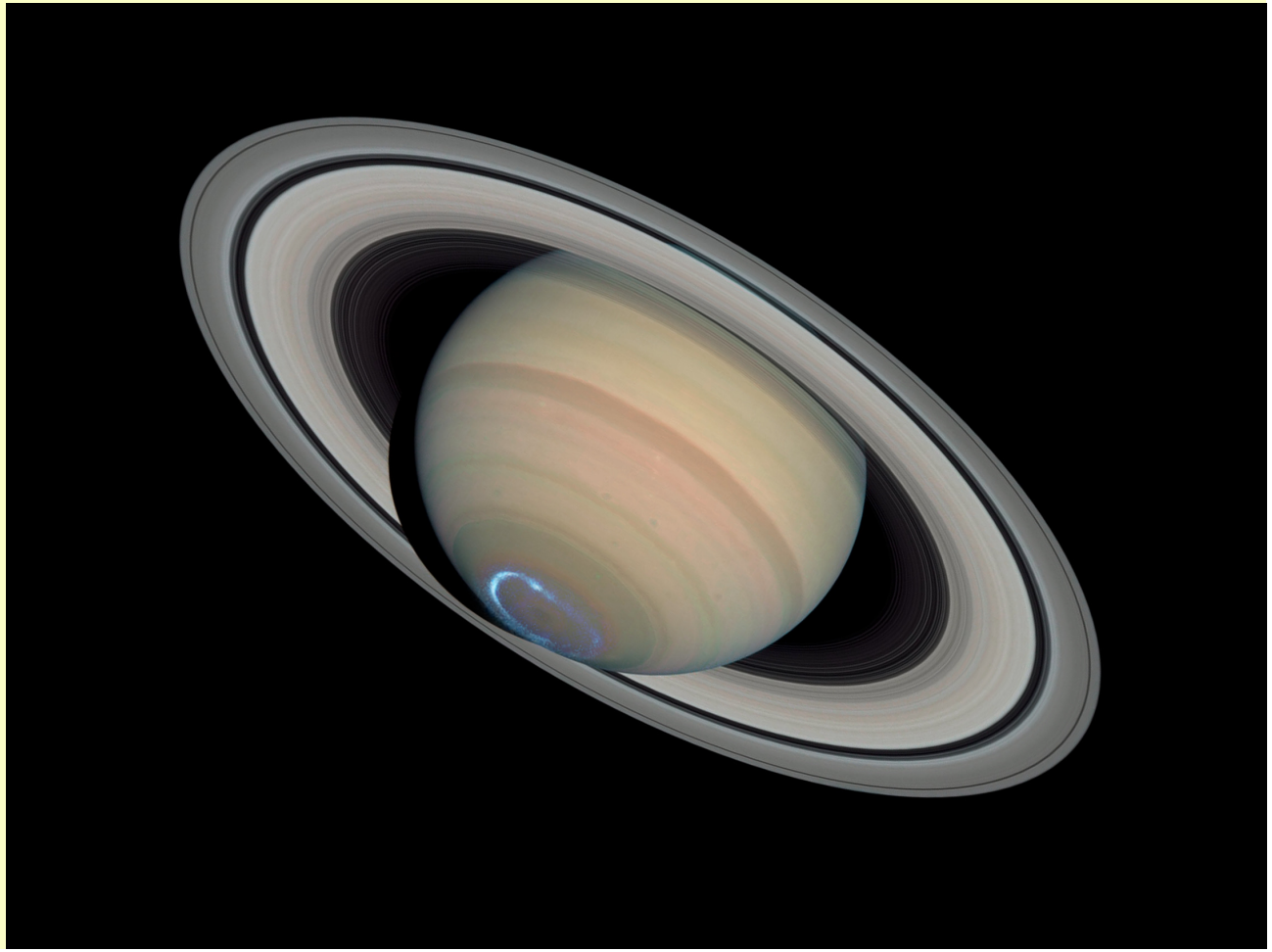
Lente gravitatoria



- Lente gravitatoria observada polo telescopio Hubble. Está provocada por un cúmulo de galaxias que está a 5.000 millóns de anos luz.

ASTRONOMÍA

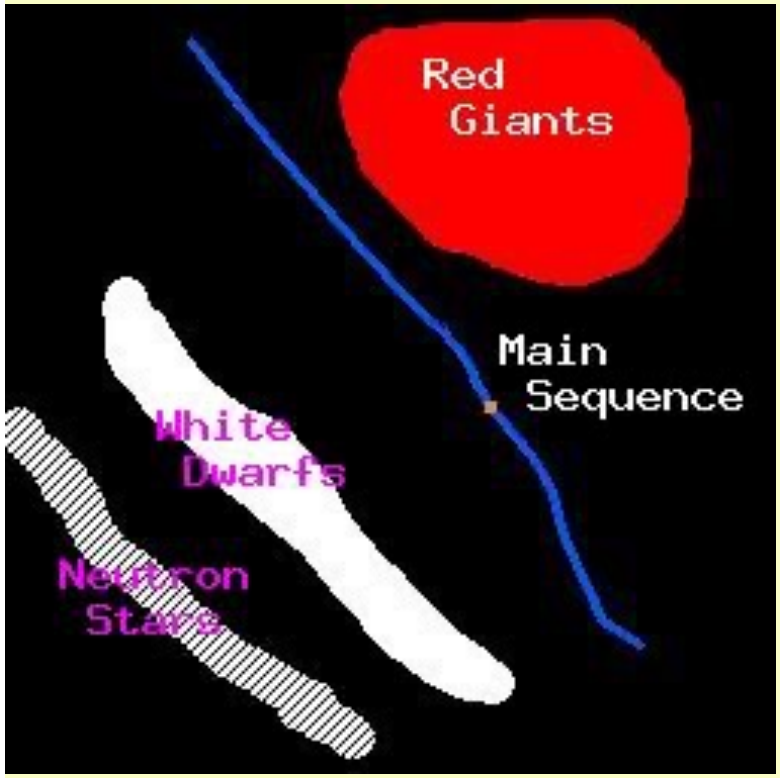
- http://hubblesite.org/

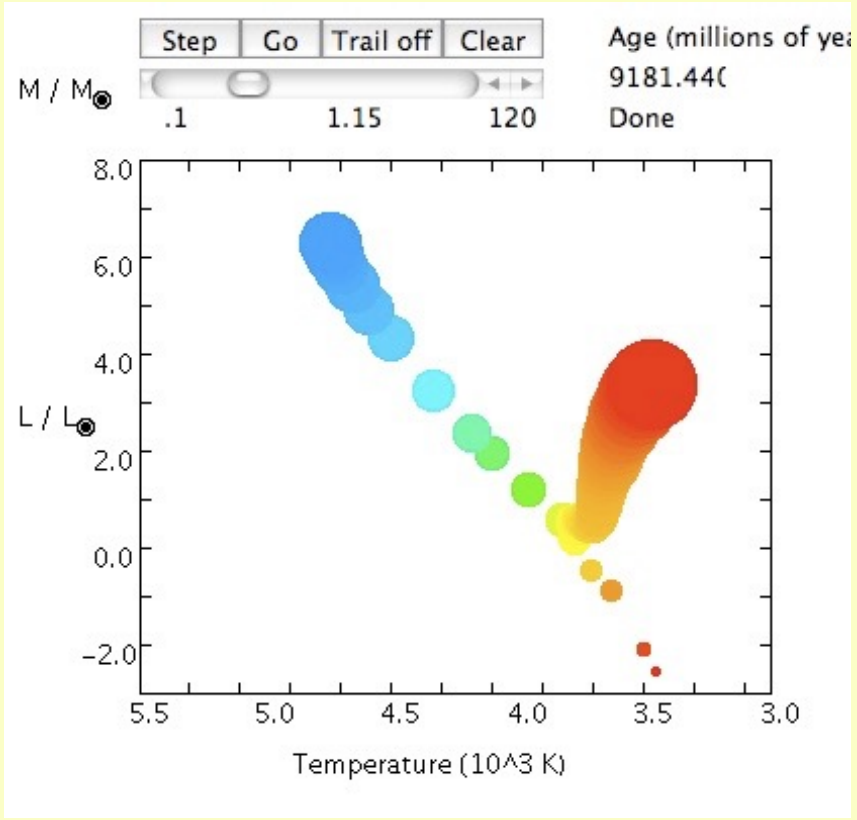


ASTRONOMÍA

ASTRONOMÍA

- Evolución do Sol



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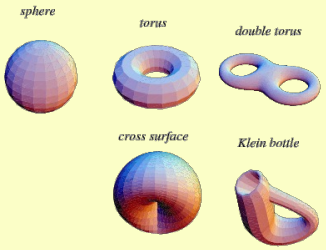
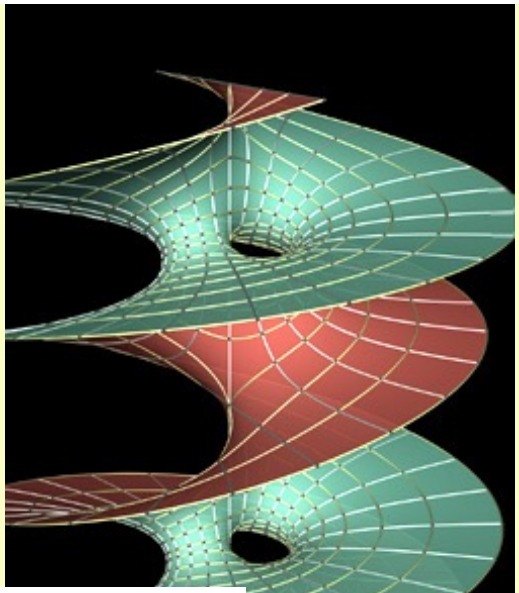
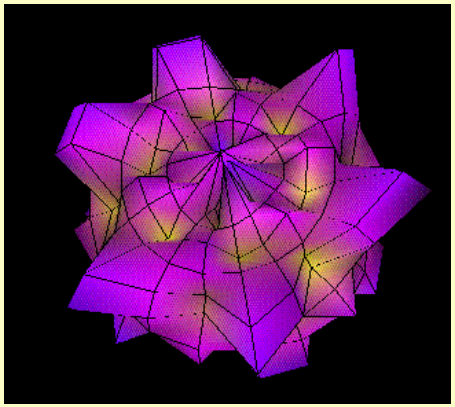
Banda de Moebius







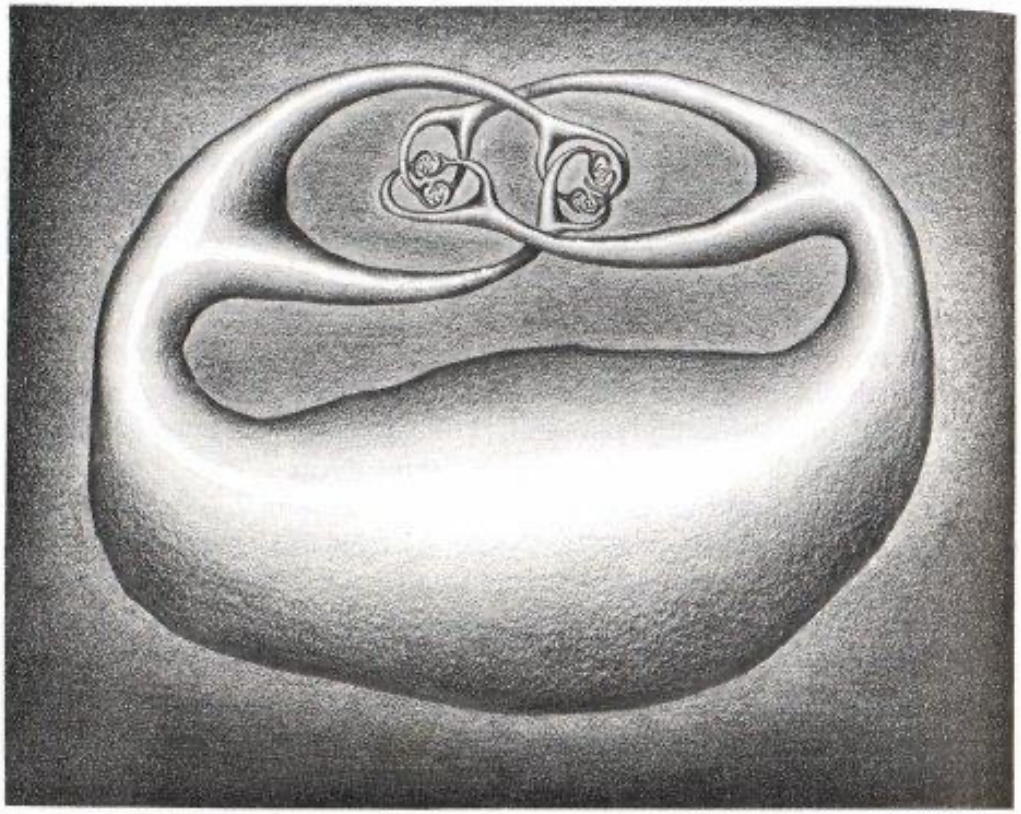


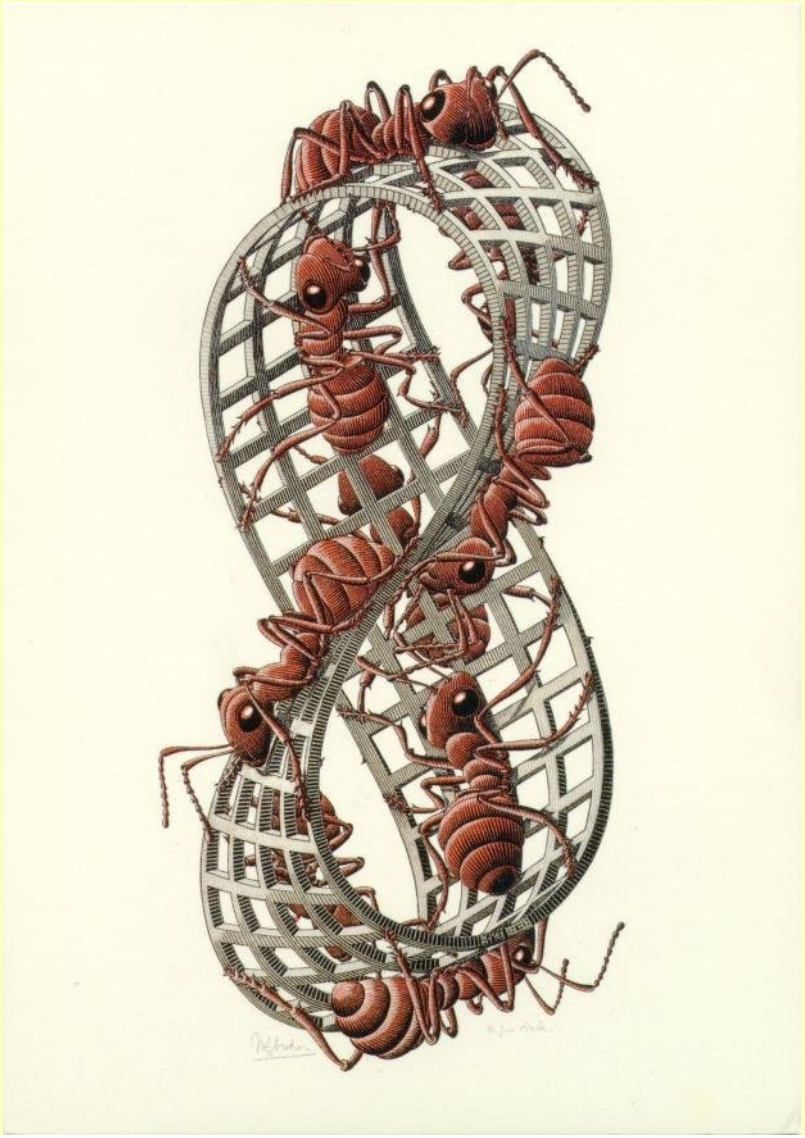
FIG. 4–11. The Alexander horned sphere.

En qué Universo vivimos?

- Grigori Perelman, matemático ruso que demostrou en 2006 a conxectura de Poincaré

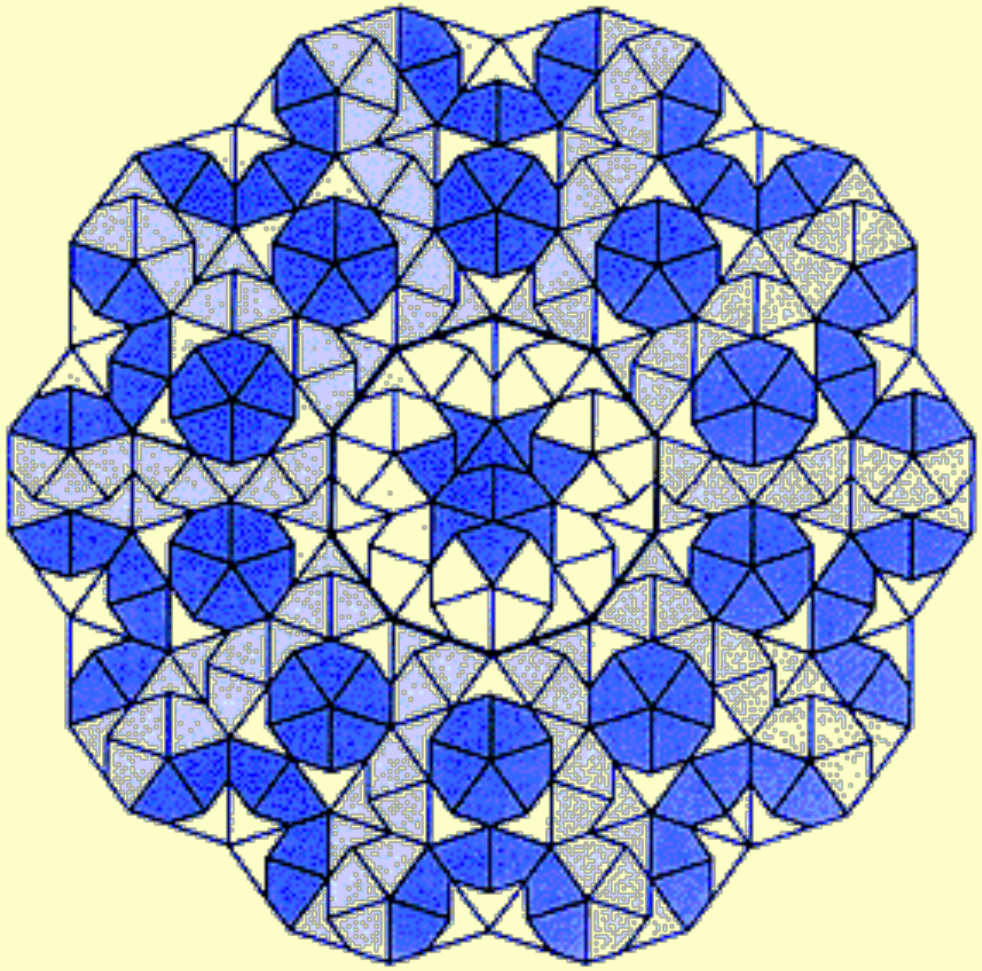
Banda de Moebius

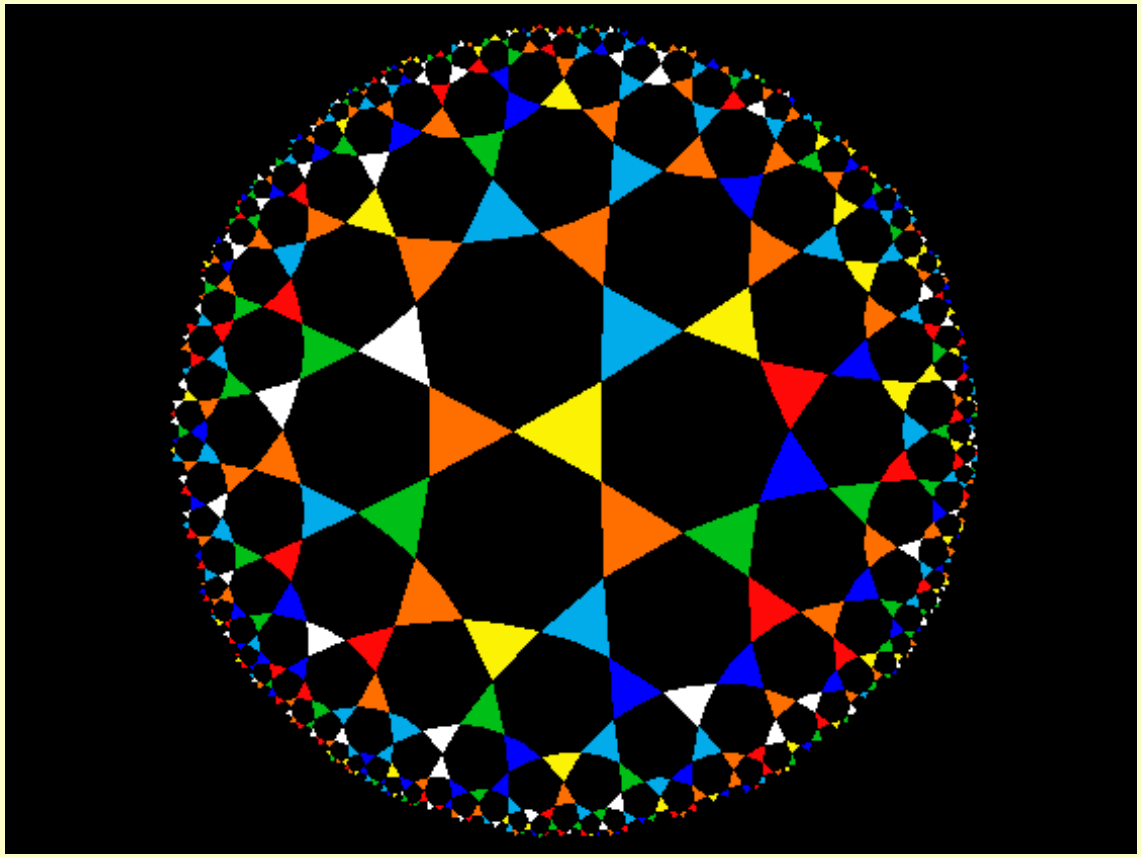
M. C. Escher (1898-1972)

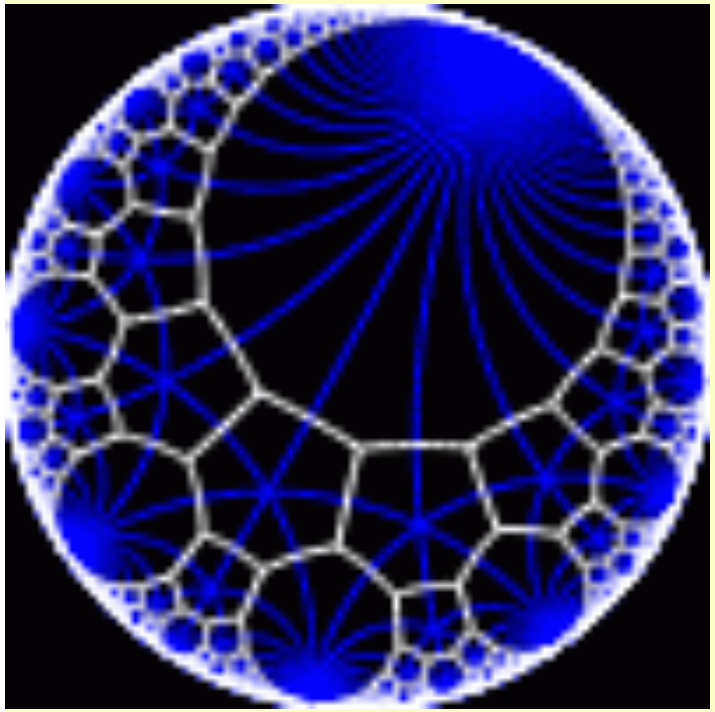


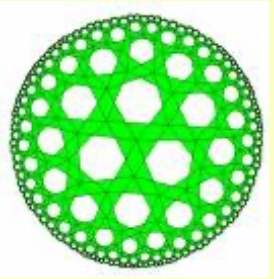
A Alhambra de Granada

R. Penrose (1931-)

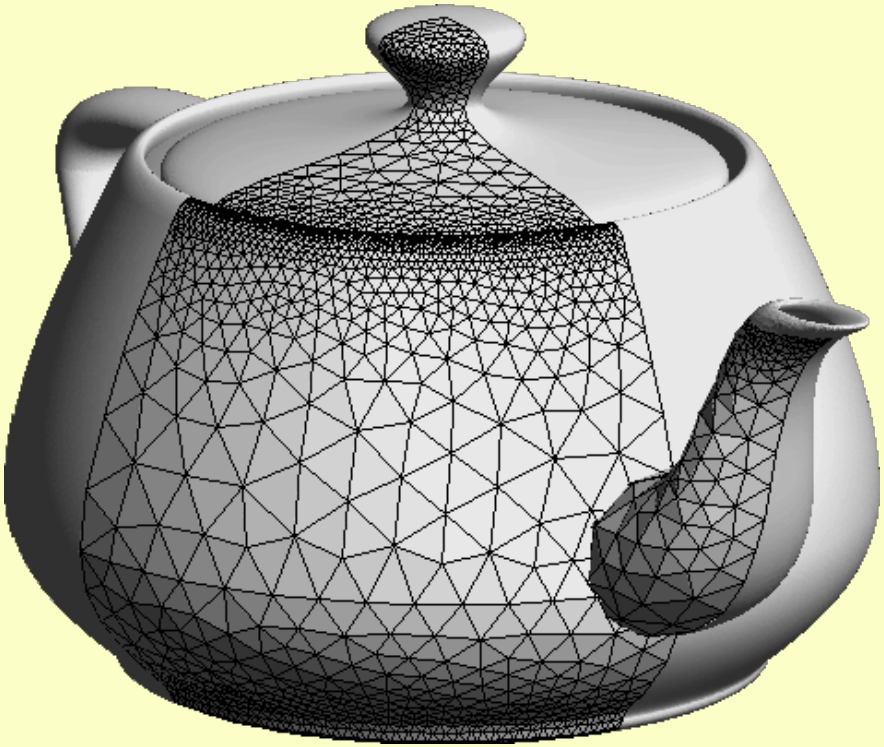


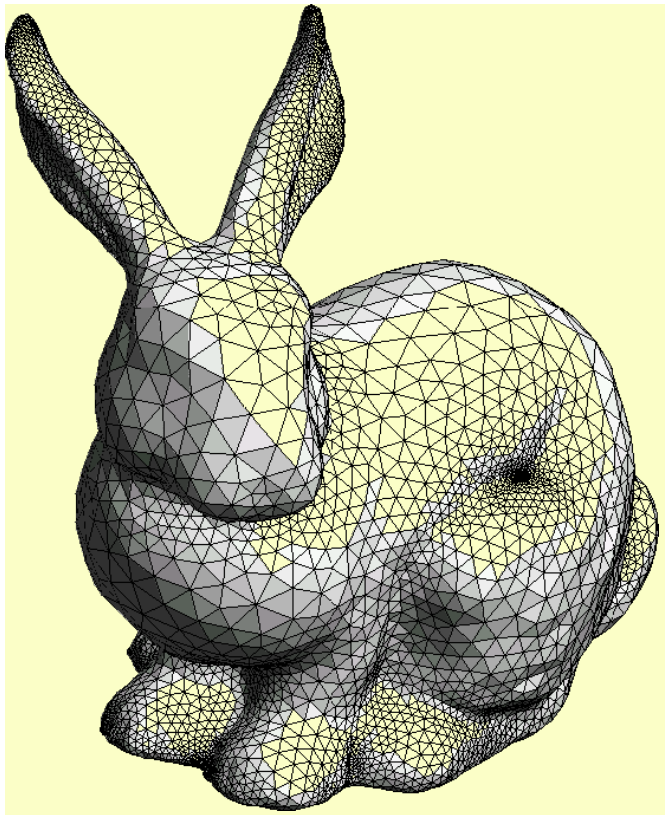






Deseño asistido por ordenador





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0.0125  0.0562508  0.450561
0.0125  -0.0562508  0.450561
0.0195312  0  0.413654
0.0210938  0.0421881  0.424797
0.0210938  -0.0421881  0.424797
0.025  0  0.413086
0.03875  0.19625  0.488037
0.03875  -0.19625  0.488037
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0.0567676  -0.188584  0.413654
0.0625  0  0.358795
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0.0747852  -0.180918  0.66803
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0.0964063  -0.171719  0.358795
0.1  0  0.769043
0.103906  0.0421881  0.777779
0.103906  -0.0421881  0.777779
0.105469  0  0.32156
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0.1125  -0.0562508  0.796997
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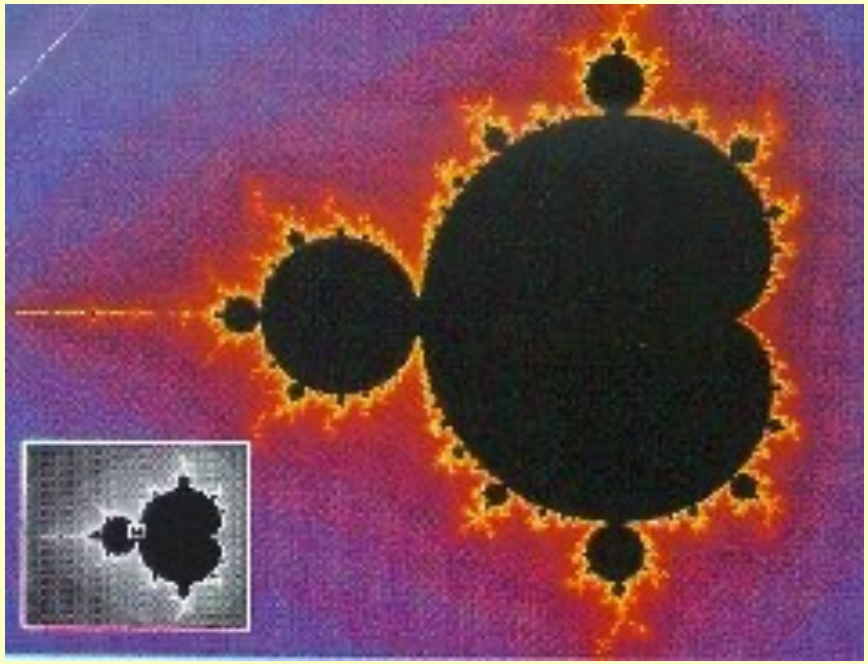
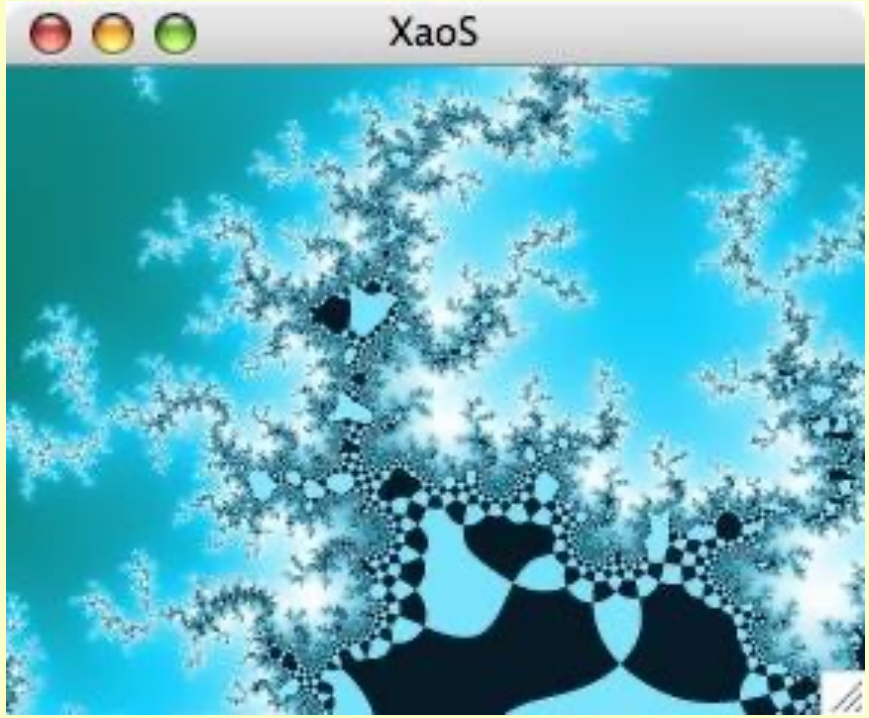
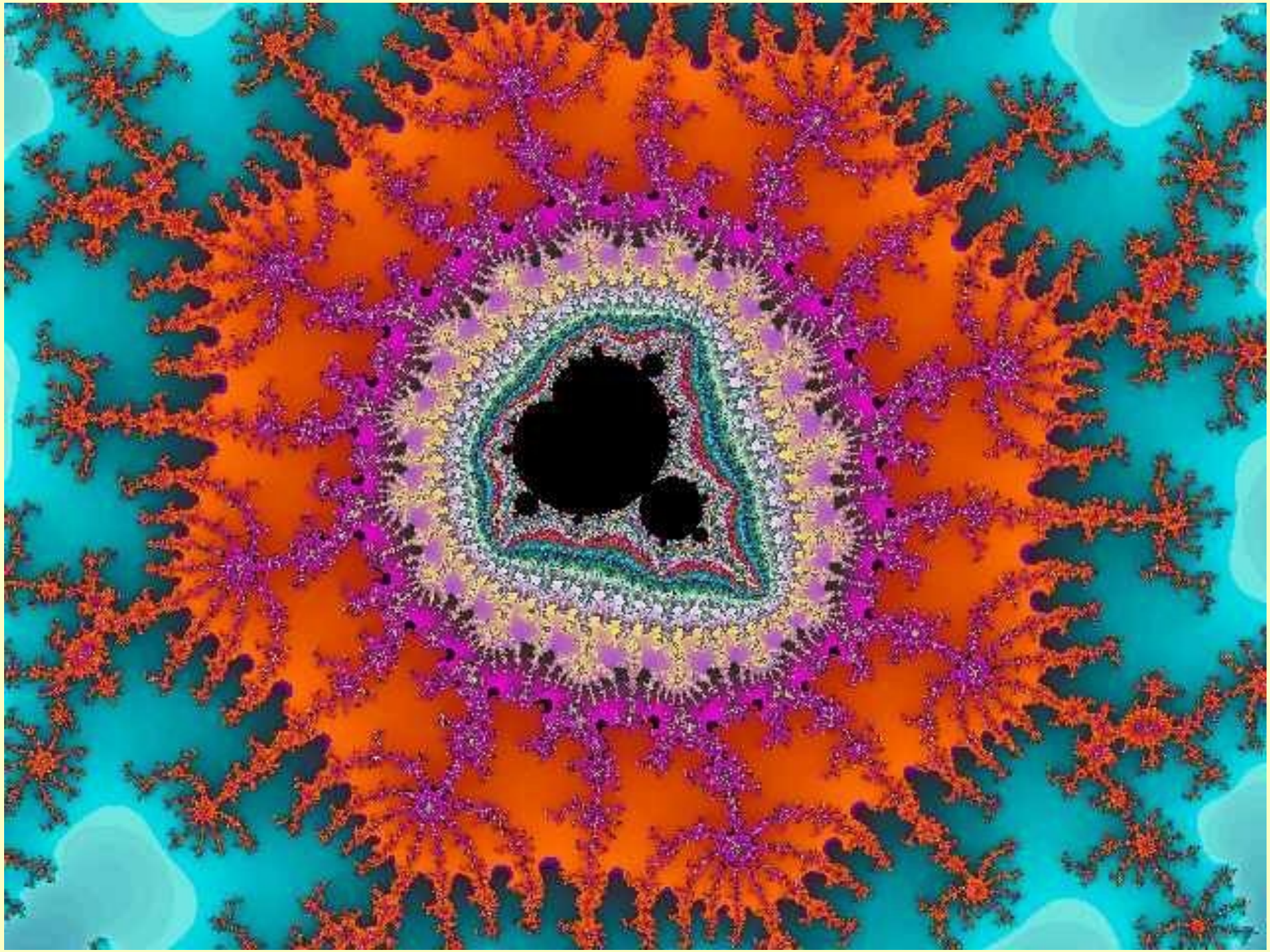
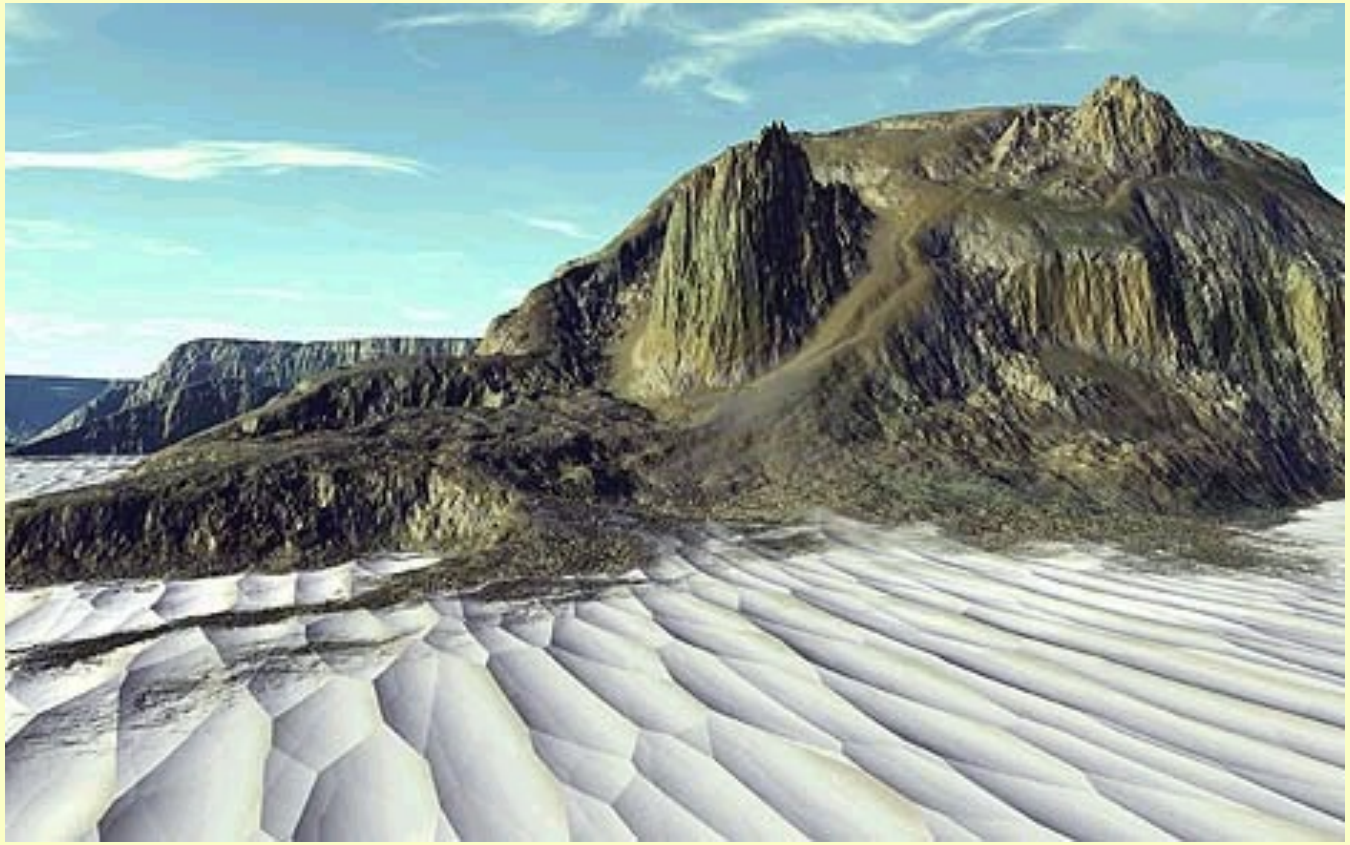
Fractais



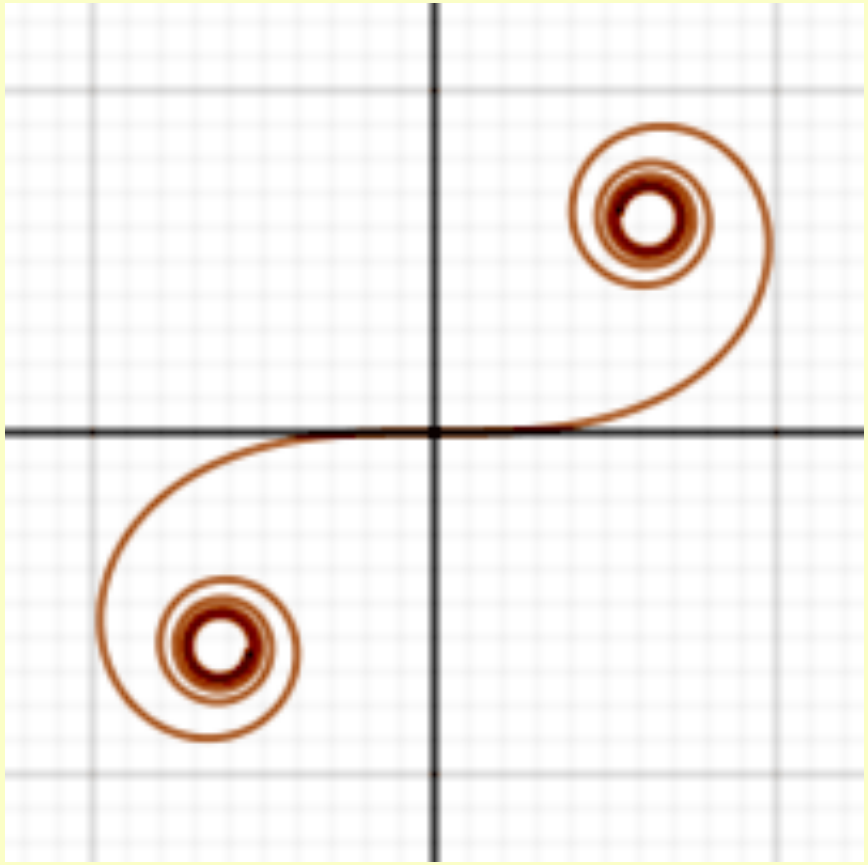




Paisaxes Fractais

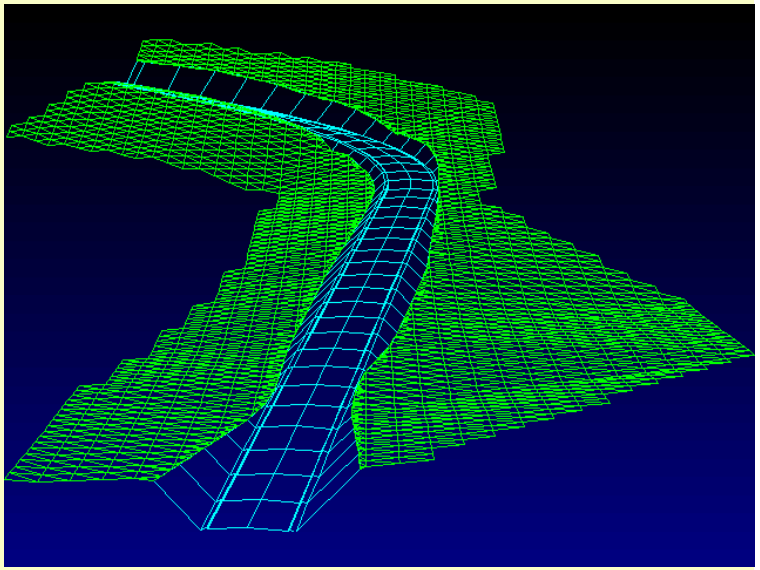


Marie Alfred Cornu (1841-1902)



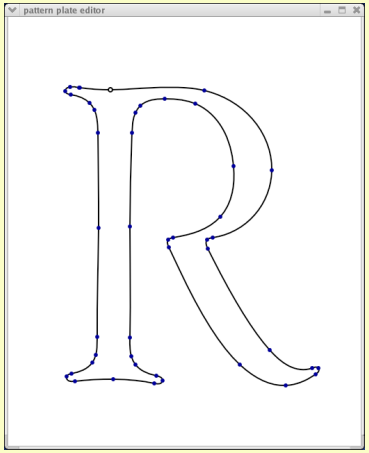
- Clotoide (Gomes, 1909)

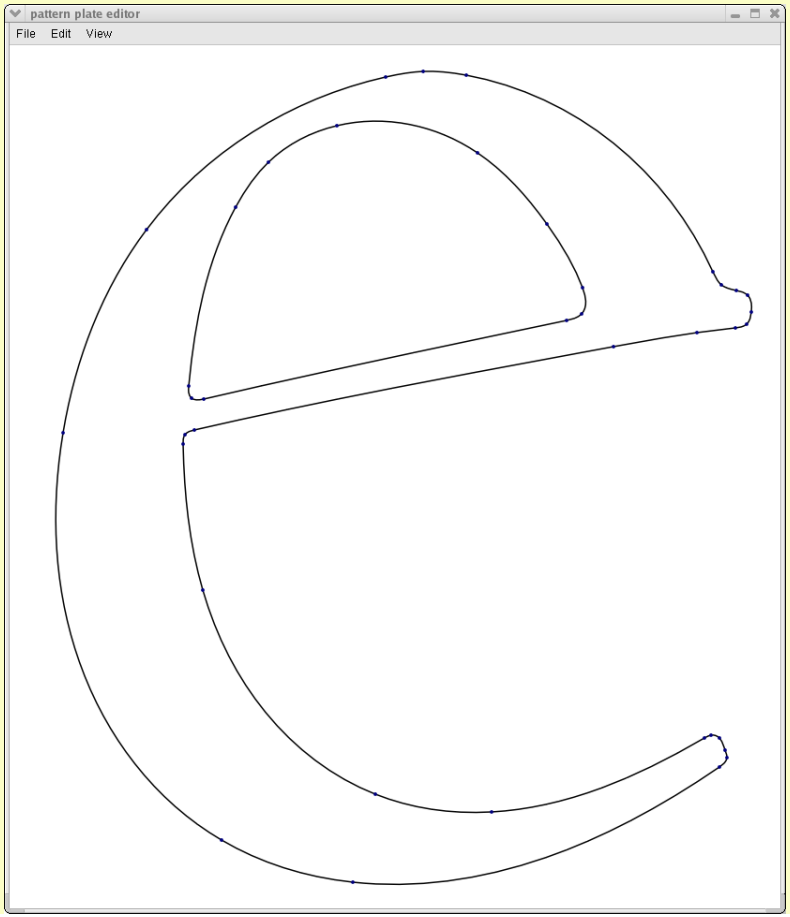
Deseño asistido por ordenador



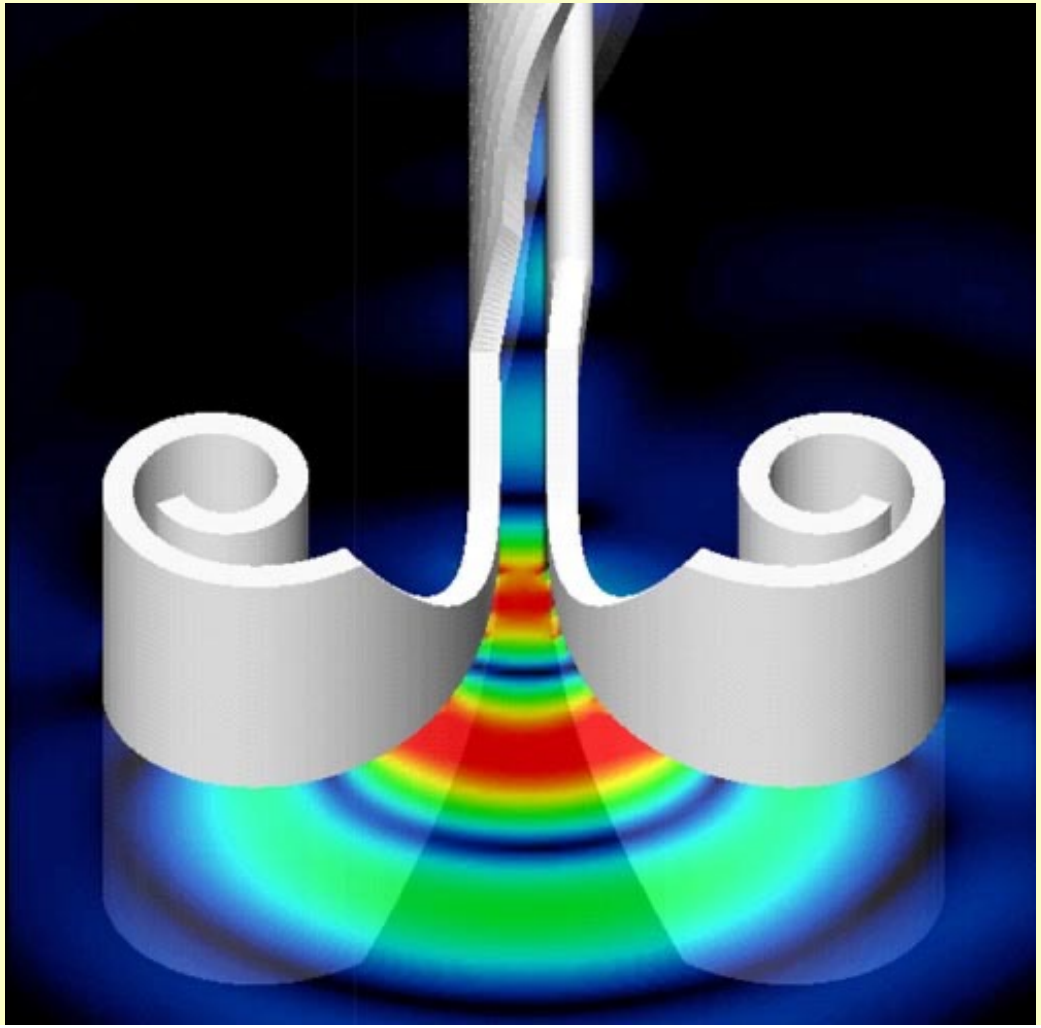
- Curvas que permiten pasar suavemente dunha recta a unha circunferencia. Dese xeito podes xirar o volante do coche e moverte a velocidade constante entrando na curva.

Deseño asistido por ordenador

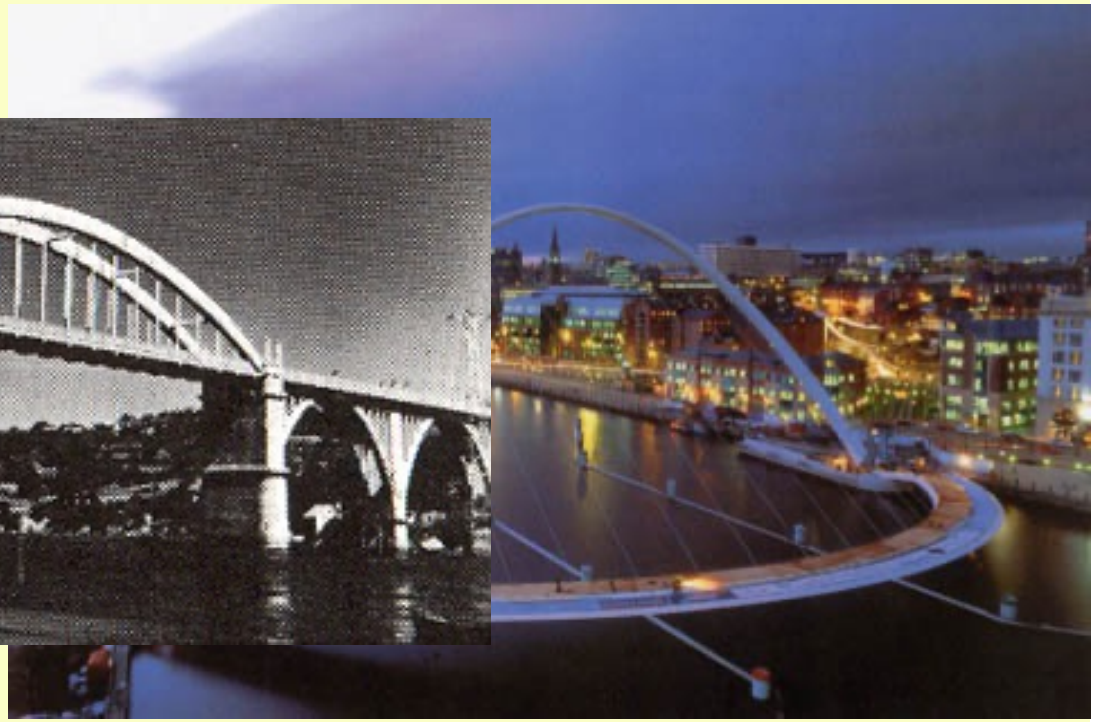


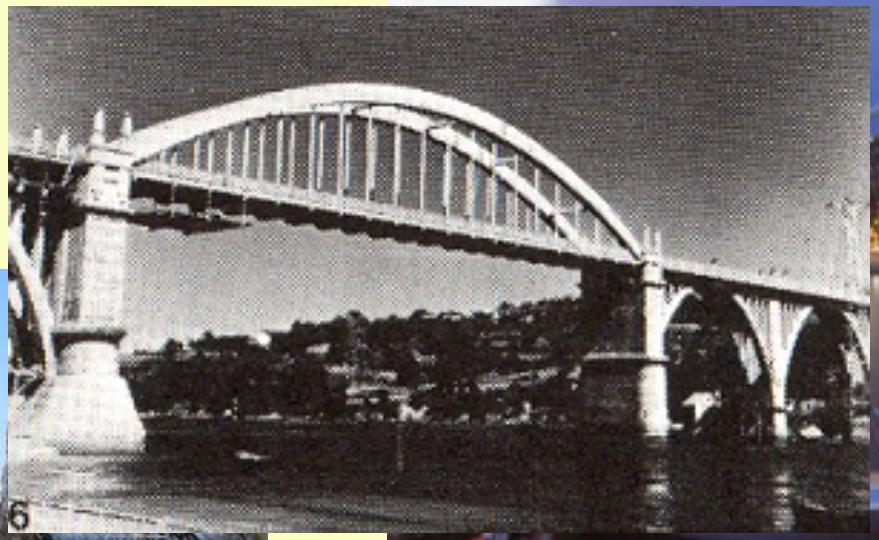


Antena de banda ultra-ancha



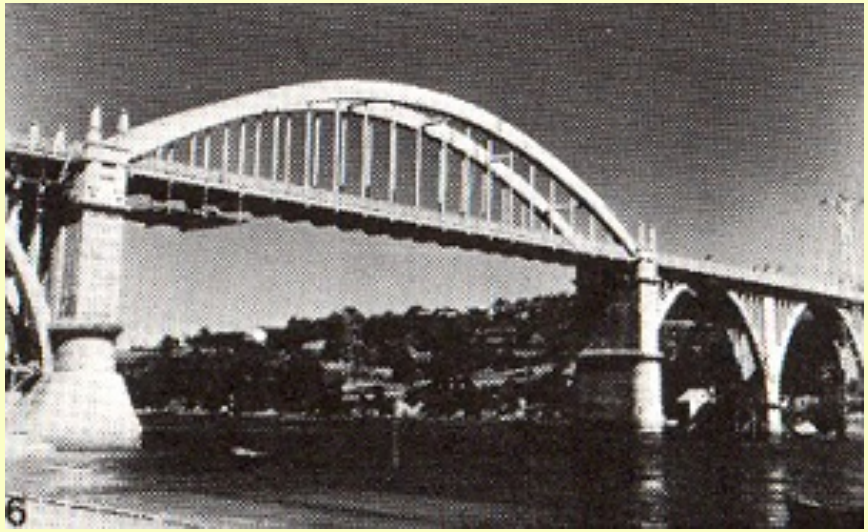
Pontes





Pontes

- A ponte do Pedrido, na ría de Betanzos (1943)



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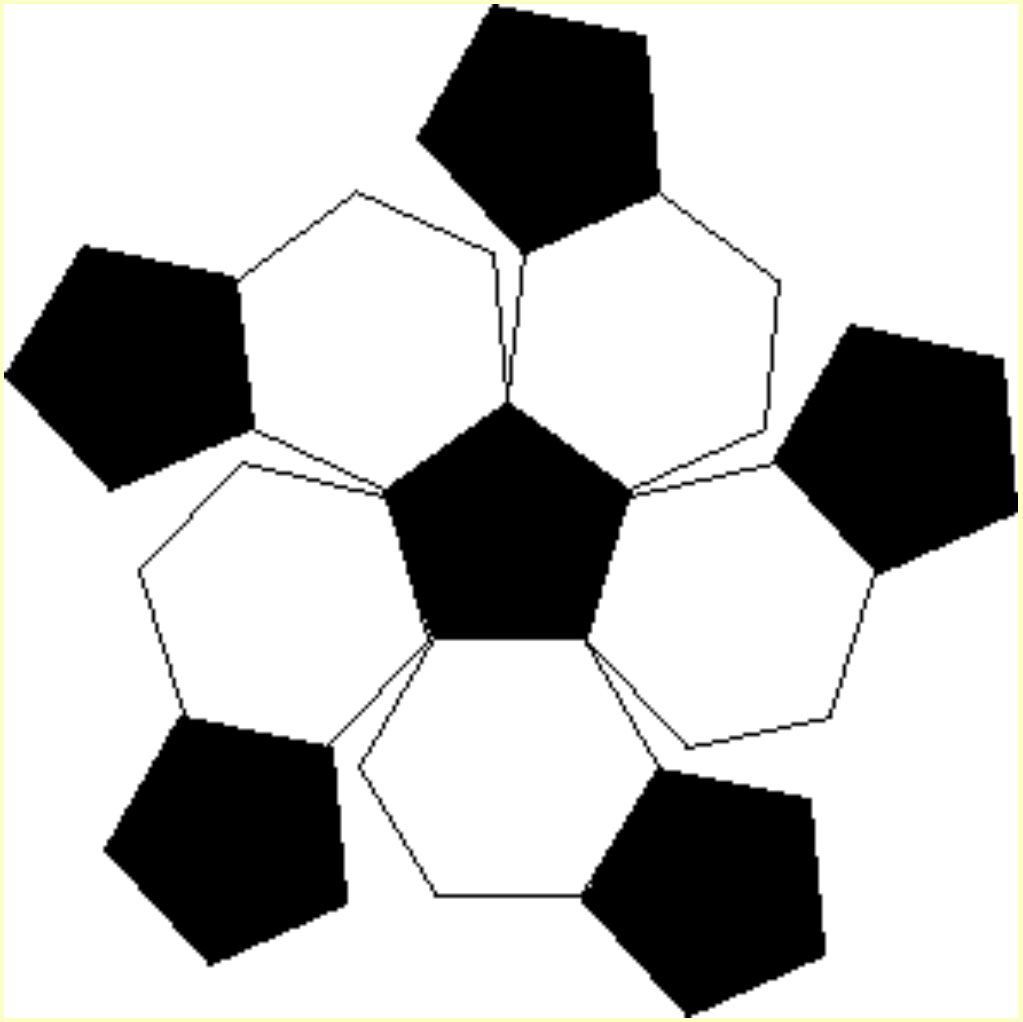
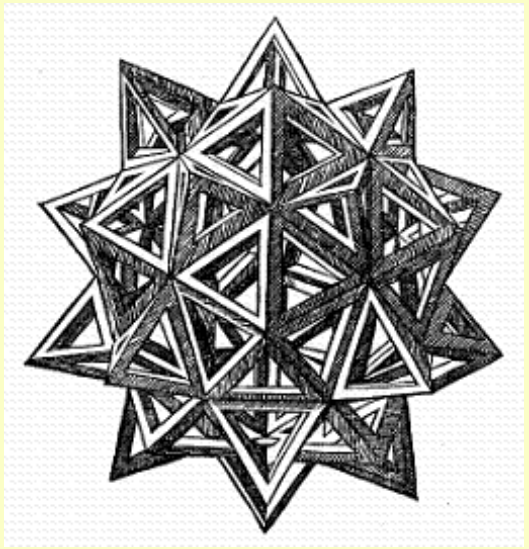
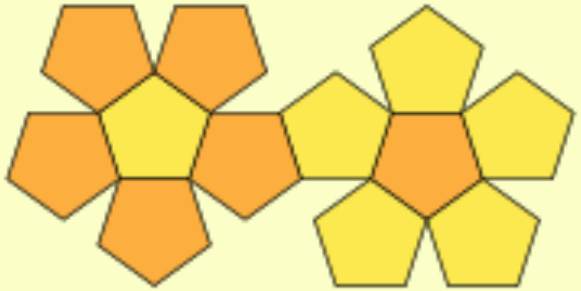
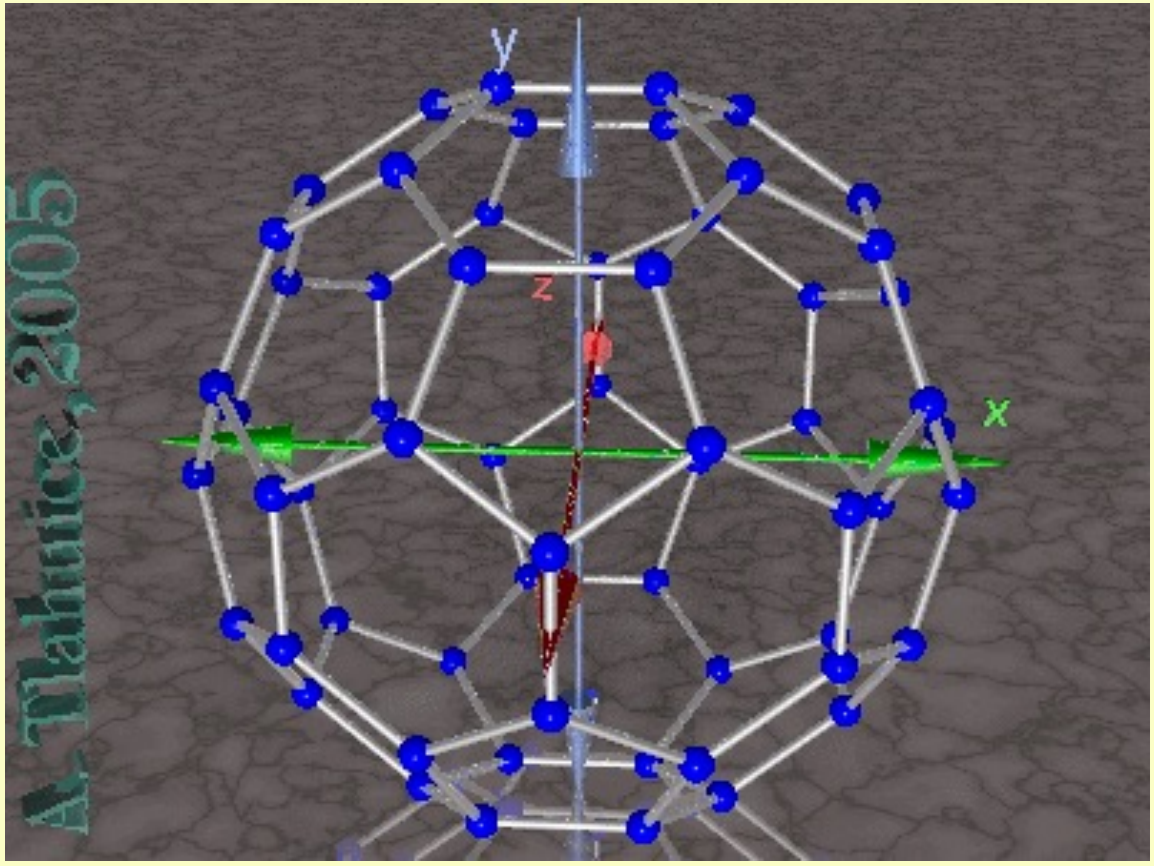


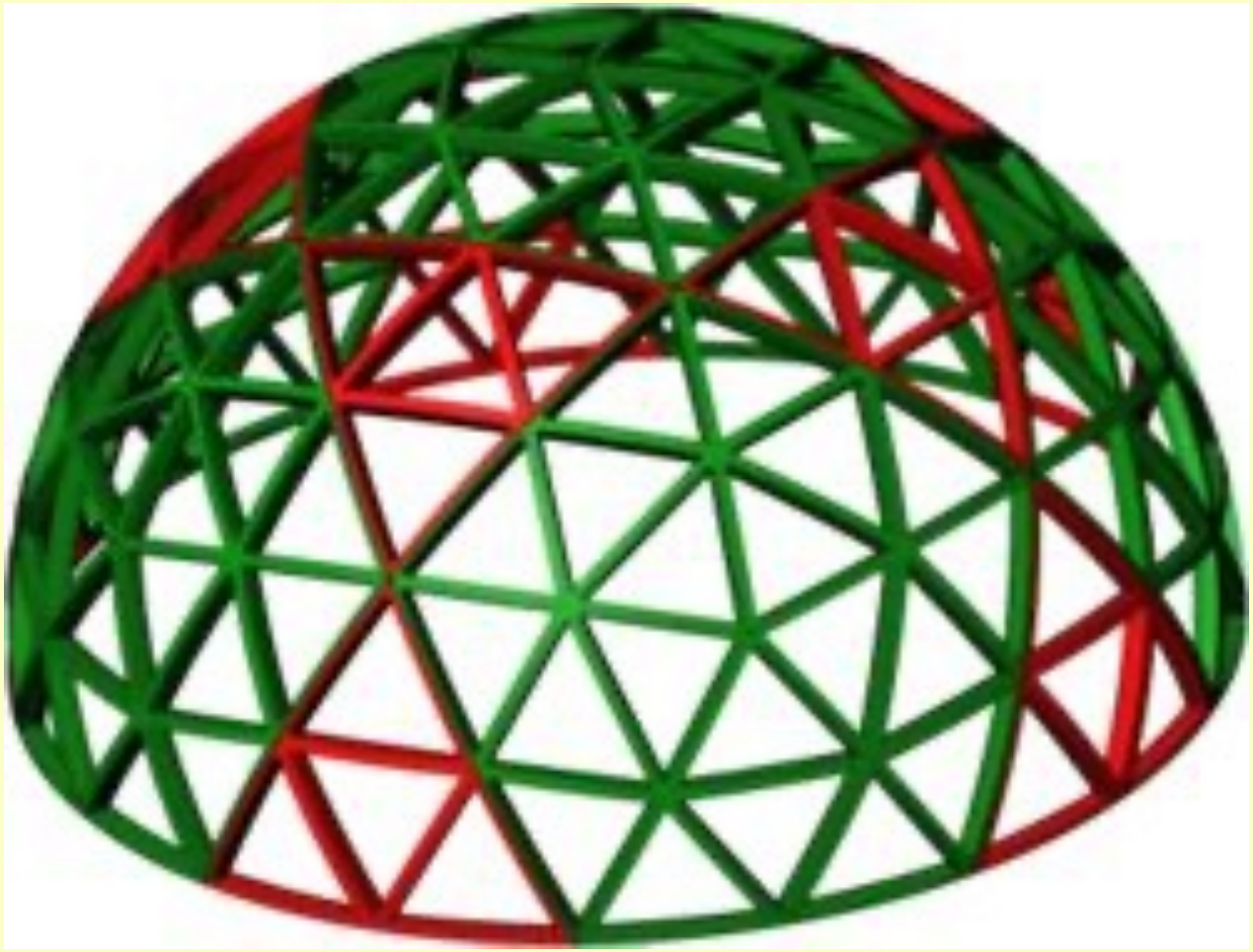




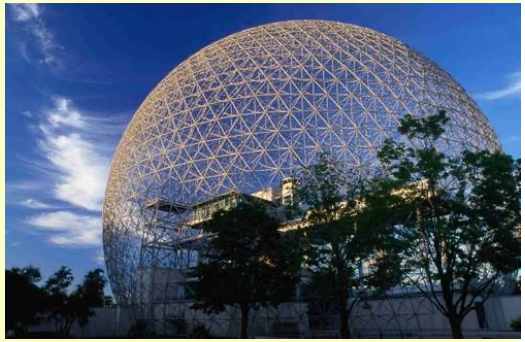
Fullereno C60

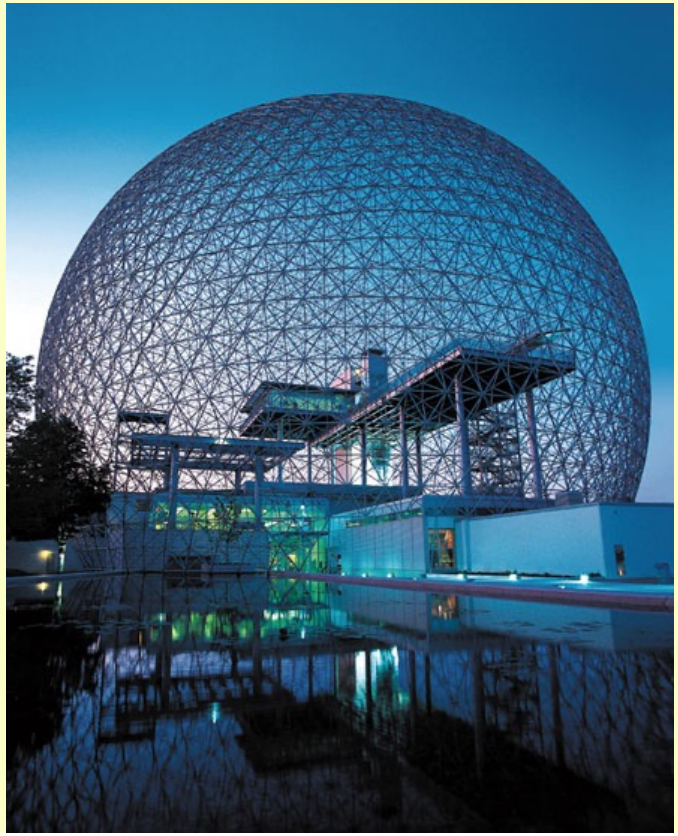


Richard Buckminster Fuller
(1895 - 1983)

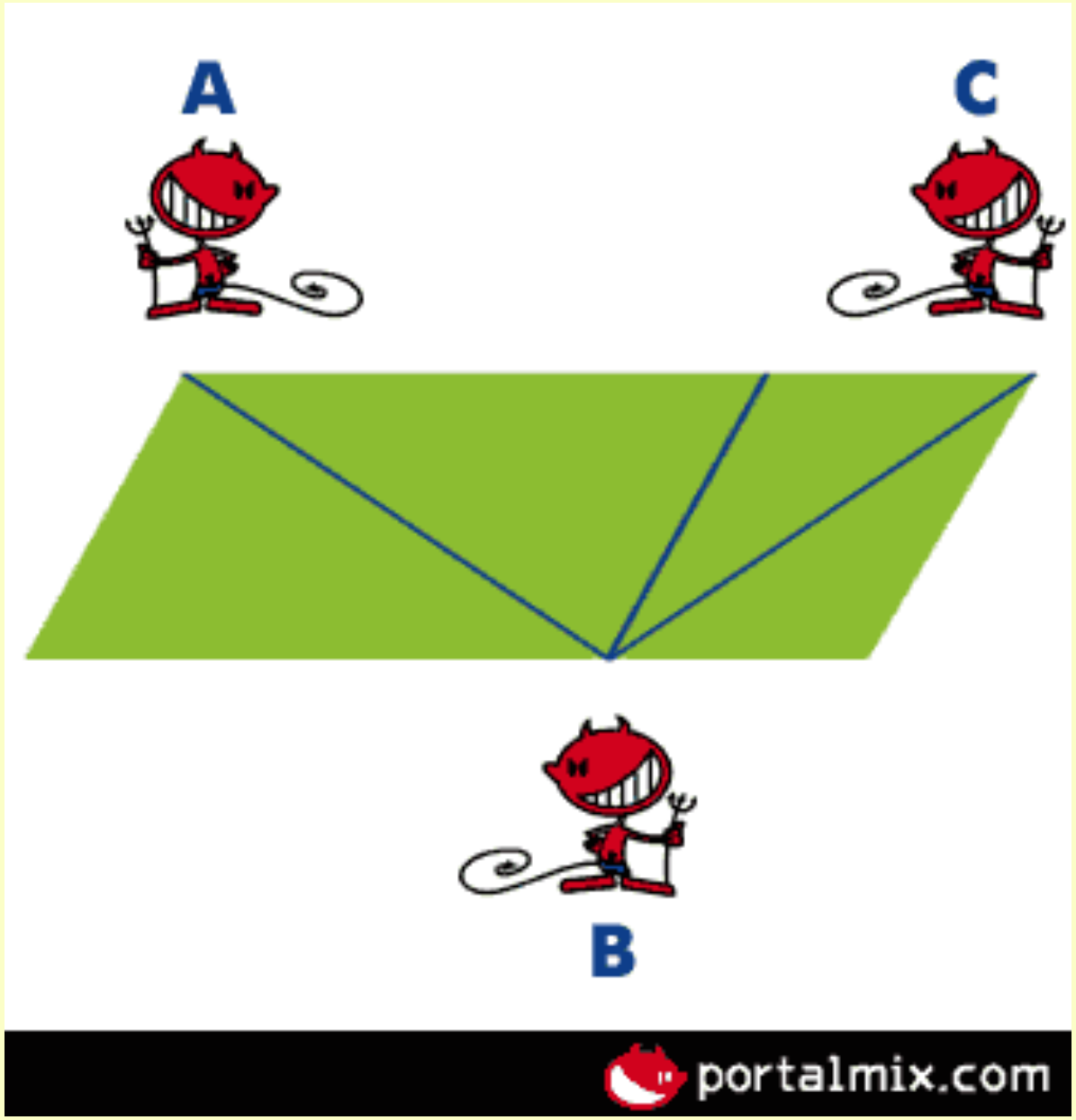


Montreal, Canadá





Cúpulas xeodésicas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C
B
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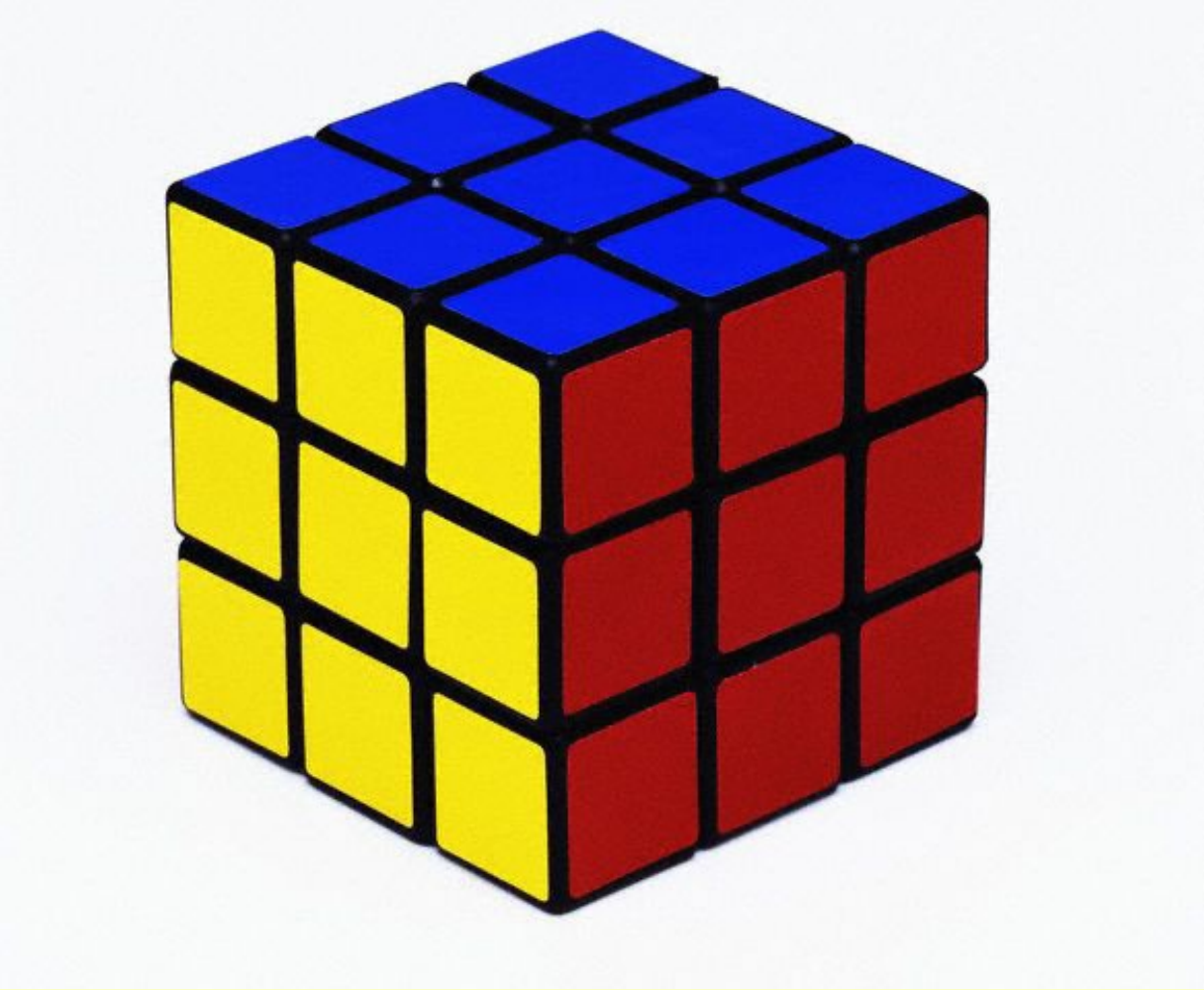
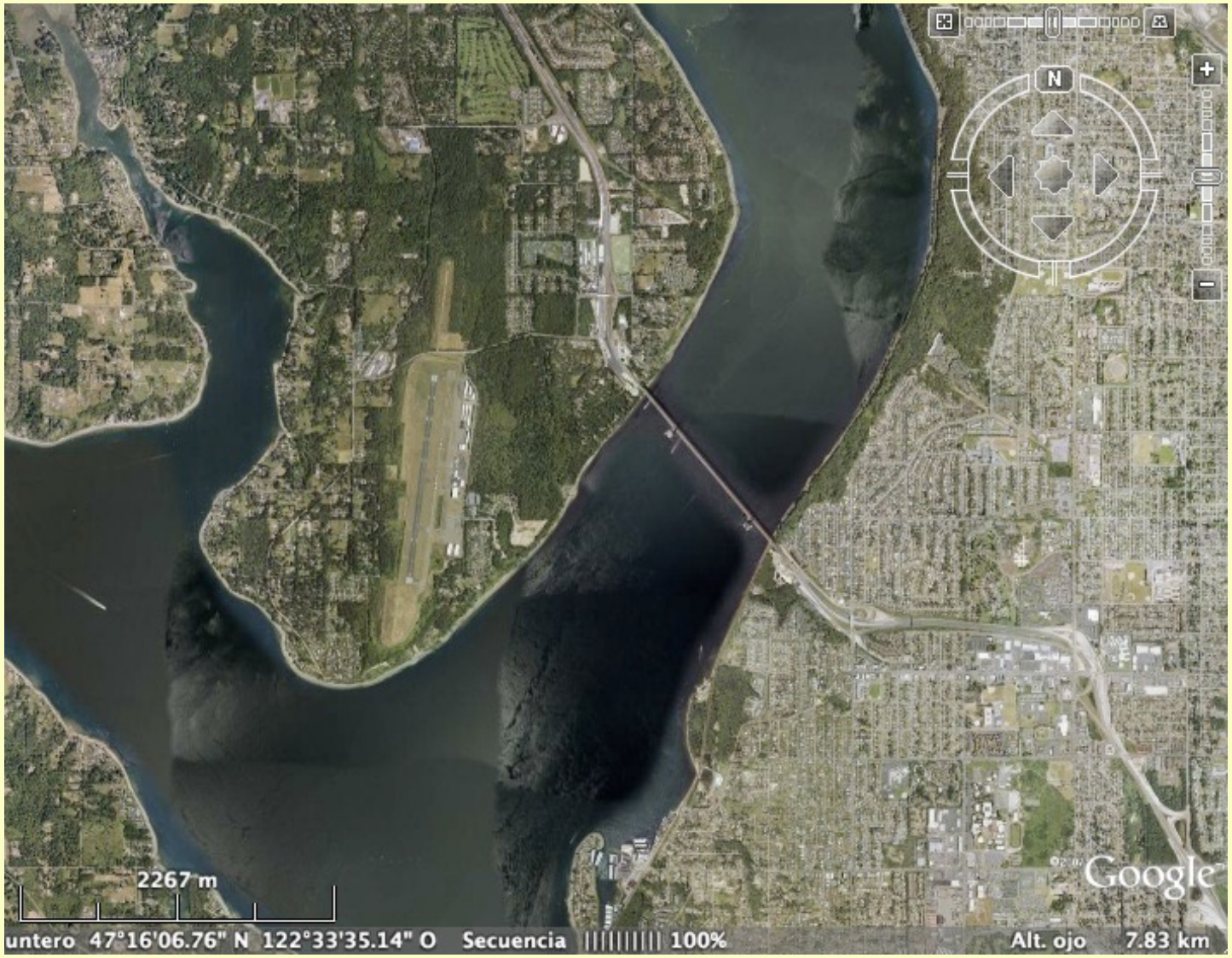
Cubo de E. Rubik (1944-)



A ponte de TACOMA



ECUACIÓNS

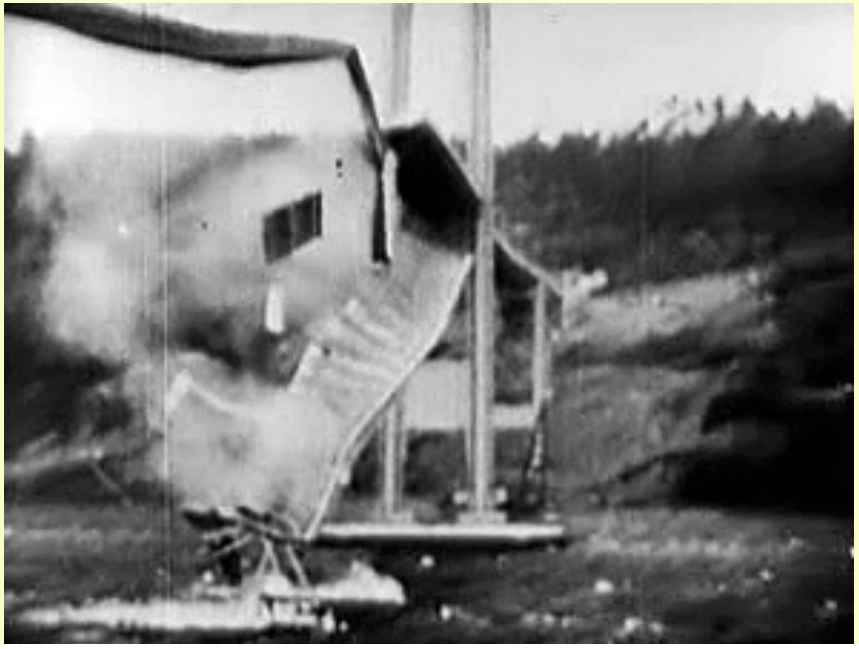
Unha ecuación non linear

dx2 / dt2+ b dx / dt +w2x = 0

tacoma.flv

A ponte de TACOMA

•O colapso inducido polo vento ocurriu o 7 de novembro de 1940.
•A ponte custara 8 millóns de dólares. Medía 1600 metros.
•O evento só pode ser comprendido mediante a análise matemática dos sistemas estructurais e aerodinámicos.



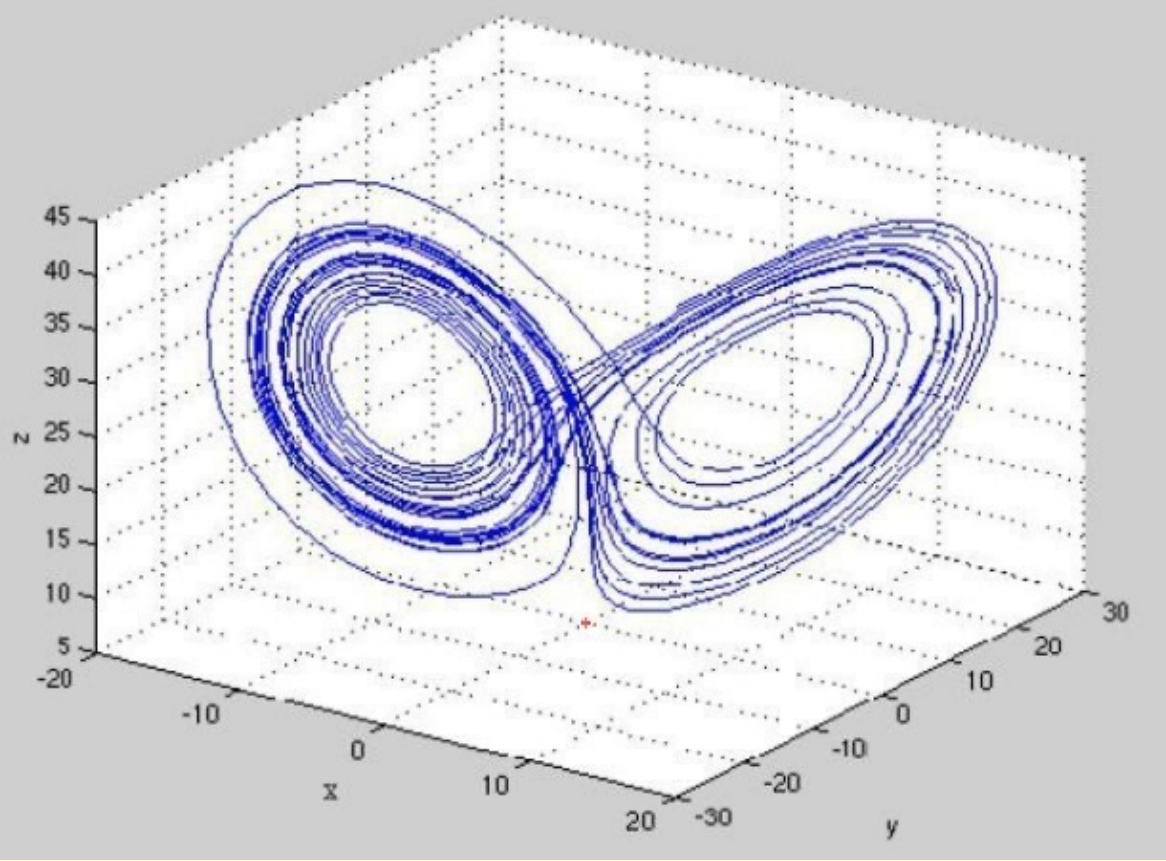
Fenómenos non lineares

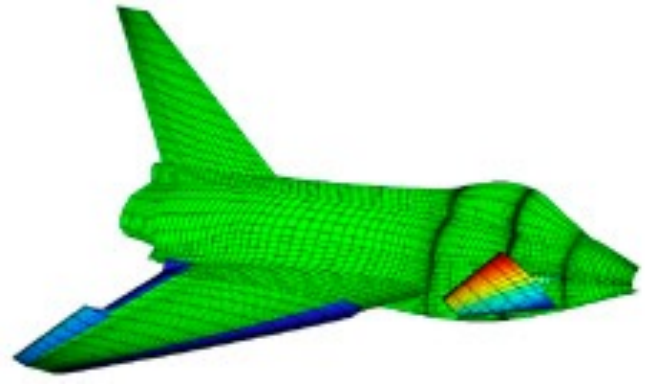
$$\frac{\partial \vec{u}}{\partial t} = -\vec{u}\cdot\vec{\nabla}\vec{u} - \dot{\eta}\frac{\partial \vec{u}}{\partial \eta} + 2\vec{\Omega}\times\vec{u} - RT\vec{\nabla}(\ln(P)) - \vec{\nabla}\phi$$

$$\frac{\partial T}{\partial t} = -\vec{u}\cdot\vec{\nabla}T - \dot{\eta}\frac{\partial T}{\partial \eta} + \frac{R}{C_p}T\frac{\omega}{P}$$

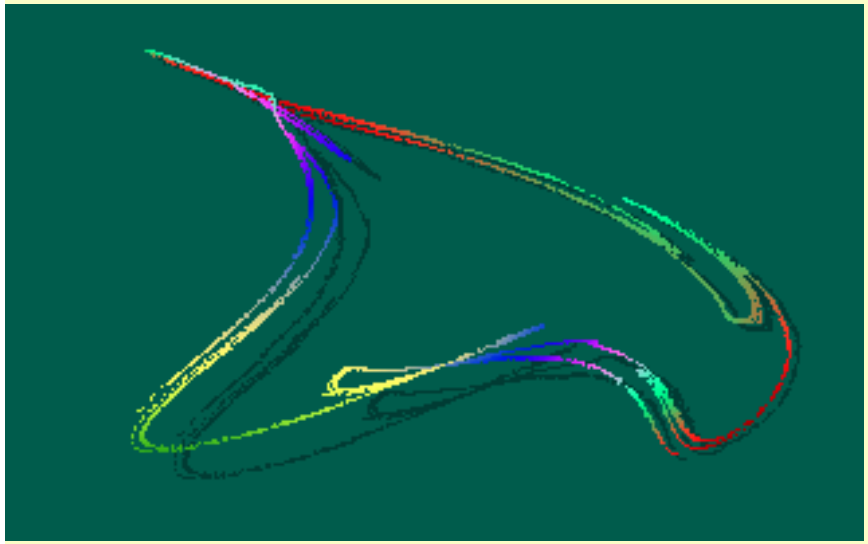
$$= -\vec{u}\cdot\vec{\nabla}q - \dot{\eta}\frac{\partial q}{\partial \eta}$$

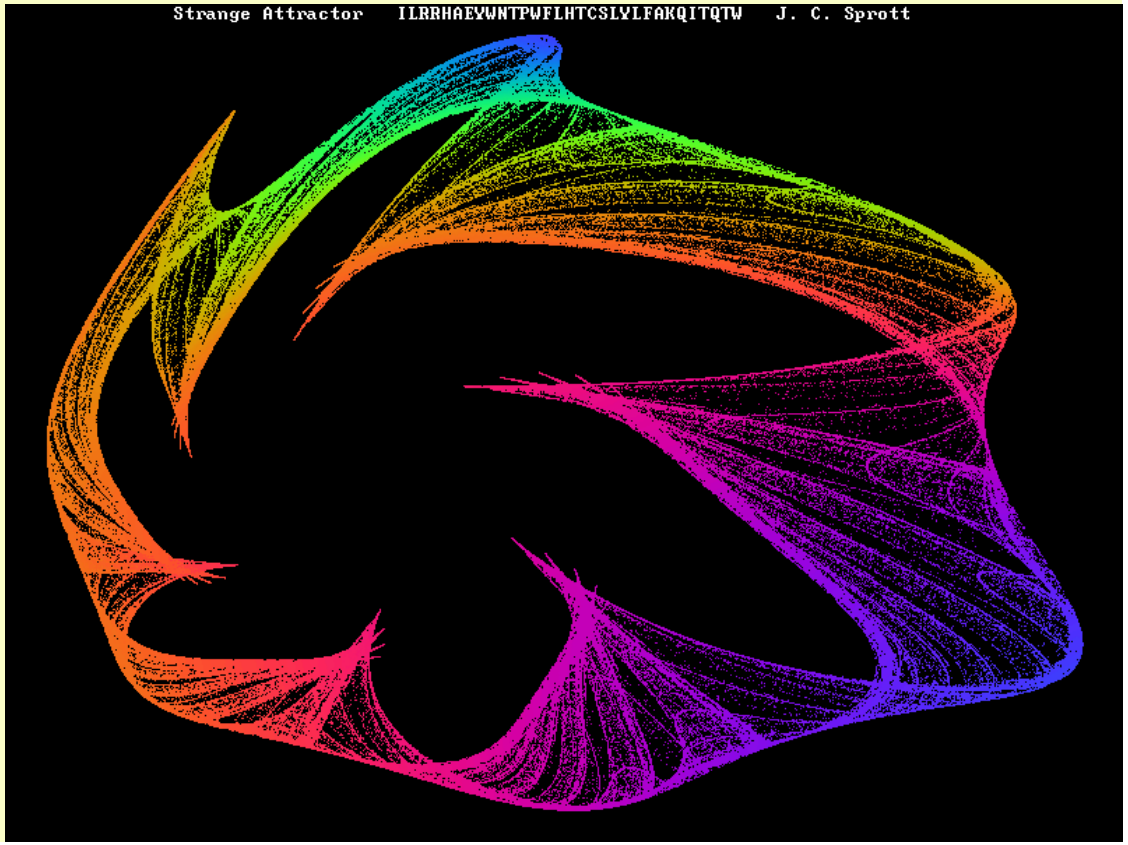
$$= -\vec{\nabla}\cdot\int_0^1 \frac{\partial P}{\partial \eta}\vec{u}\,d\eta$$





Atractor estrano

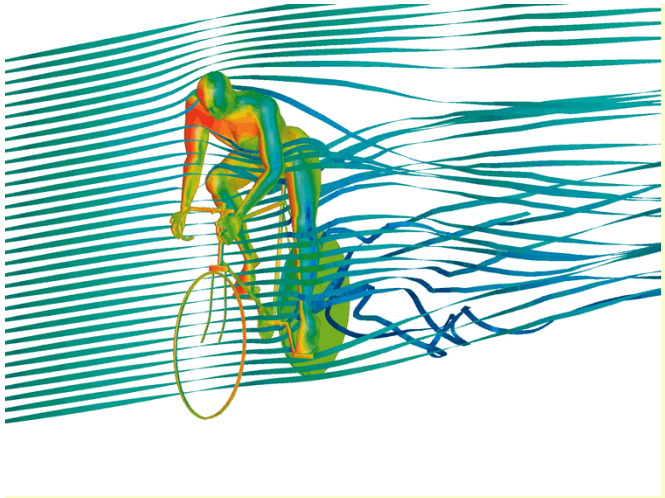


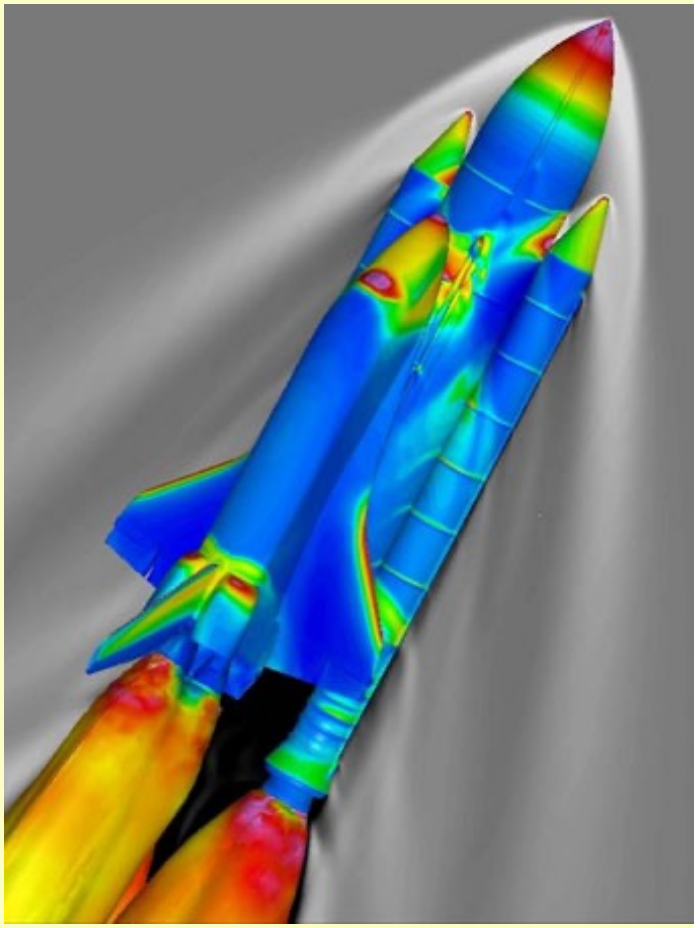


O tempo

- As ondas

•Dinámica de fluídos

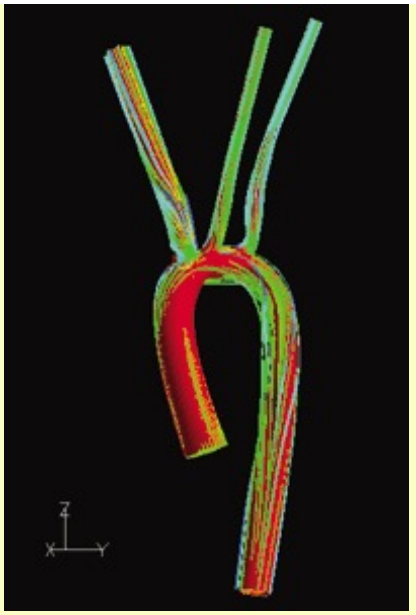


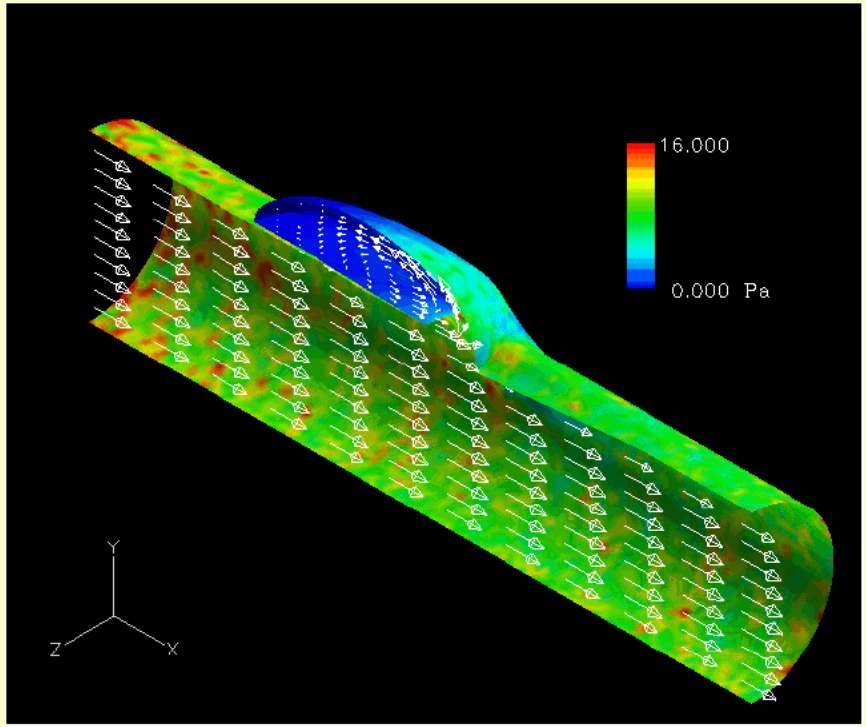


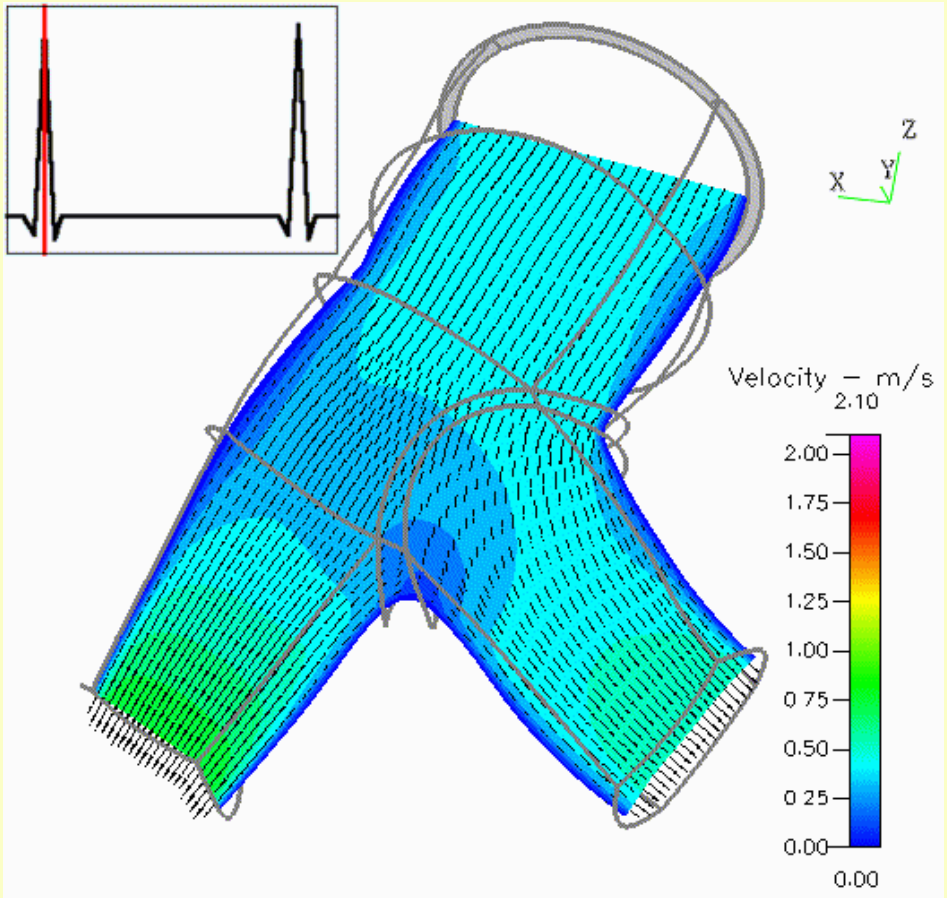
- Turbulencias

•Ondas de choque

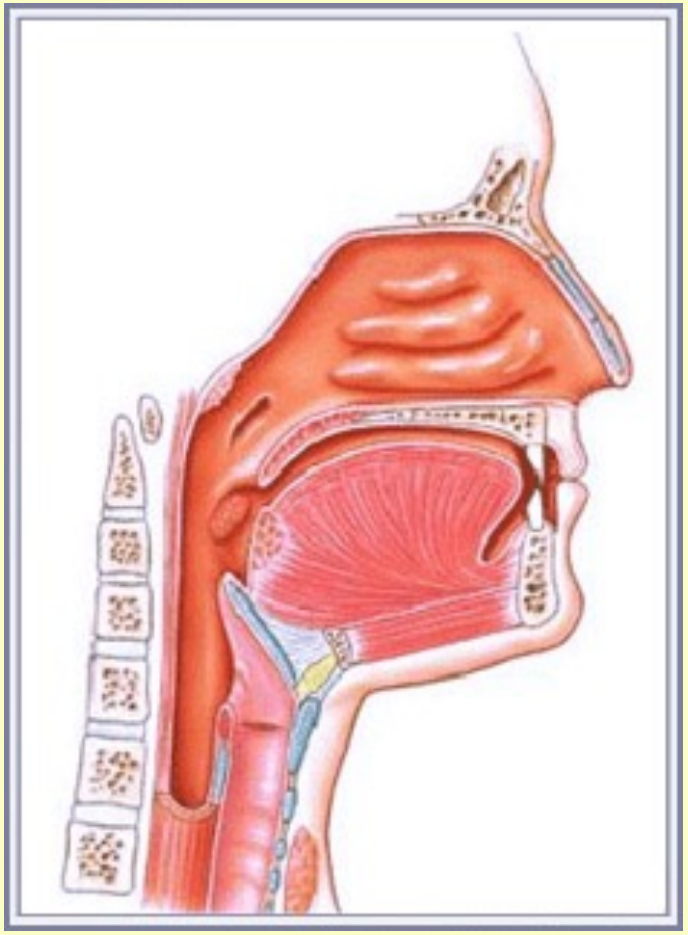
- Aparello circulatorio, fluxo do sangue

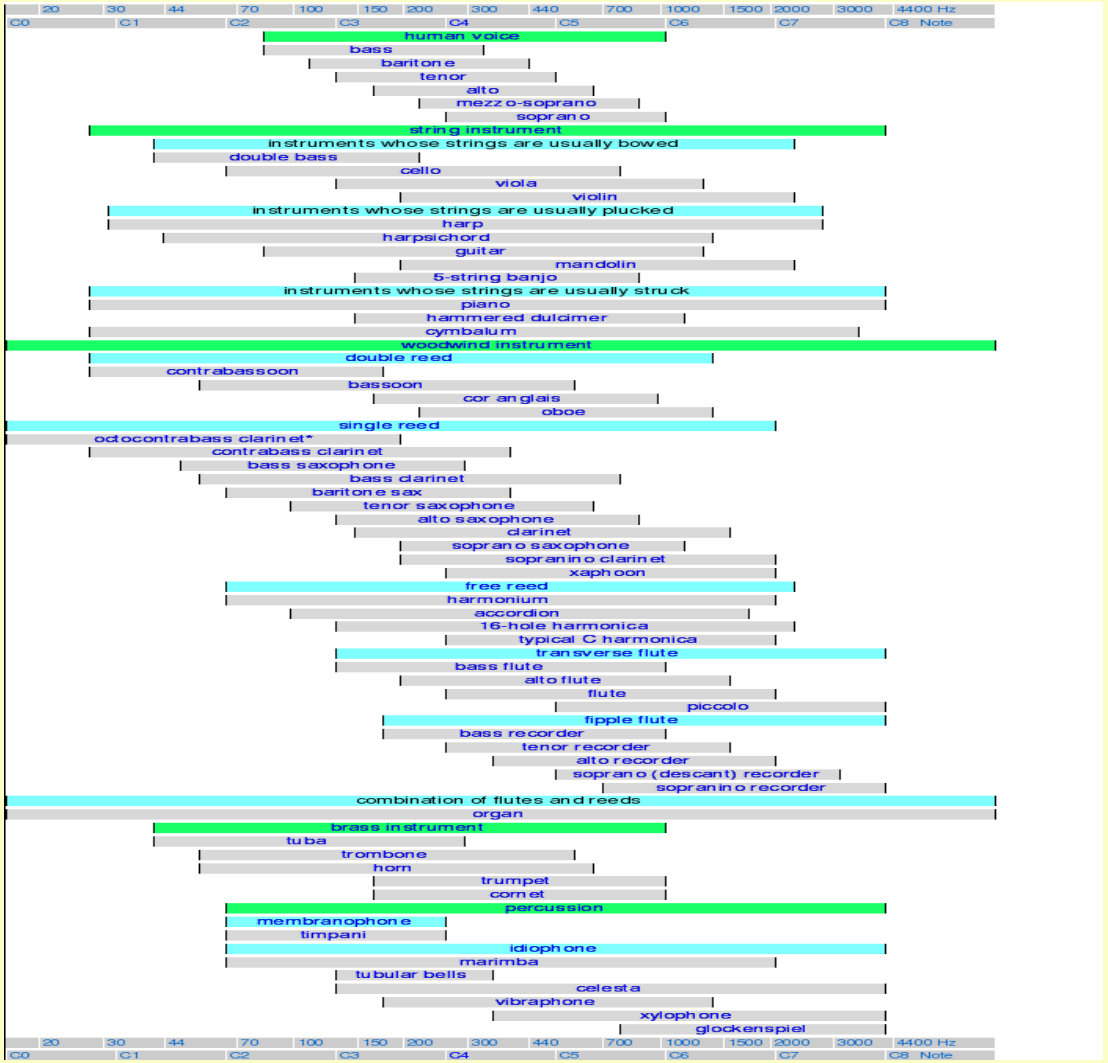






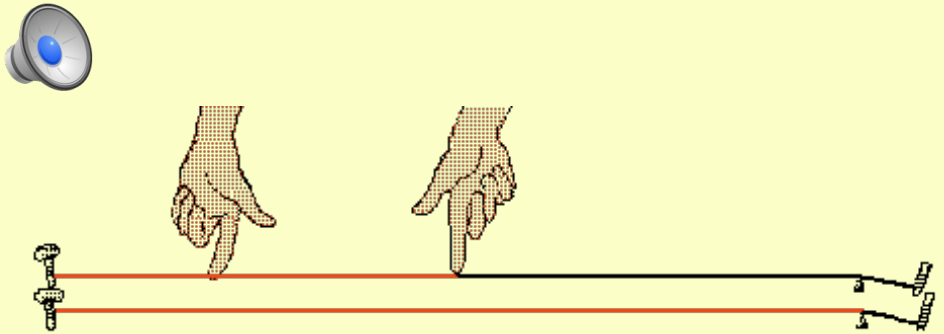
A voz humana




20 30 44 70 100 150 200 300 440 700 1000 1500 2000 3000 4400 Hz
C0 C1 C2 C3 C4 C5 C6 C7 C8 Note
human voice
bass
baritone
tenor
alto
mezzo-soprano
soprano
string instrument
instruments whose strings are usually bowed
double bass
cello
viola
violin
instruments whose strings are usually plucked
harp
harpsichord
guitar
mandolin
5-string banjo
instruments whose strings are usually struck
piano
hammered dulcimer
cymbalum
woodwind instrument
double reed
contrabassoon
bassoon
cor anglais
oboe
single reed
octocontrabass clarinet*
contrabass clarinet
bass saxophone
bass clarinet
baritone sax
tenor saxophone
alto saxophone
clarinet
soprano saxophone
sopranino clarinet
xaphoon
free reed
harmonium
accordion
16-hole harmonica
typical C harmonica
transverse flute
bass flute
alto flute
flute
piccolo
fipple flute
bass recorder
tenor recorder
alto recorder
soprano (descant) recorder
sopranino recorder
combination of flutes and reeds
organ
brass instrument
tuba
trombone
horn
trumpet
cornet
percussion
membranophone
timpani
idiophone
marimba
tubular bells
celesta
vibraphone
xylophone
glockenspiel
20 30 44 70 100 150 200 300 440 700 1000 1500 2000 3000 4400 Hz
C0 C1 C2 C3 C4 C5 C6 C7 C8 Note

Música e matemáticas

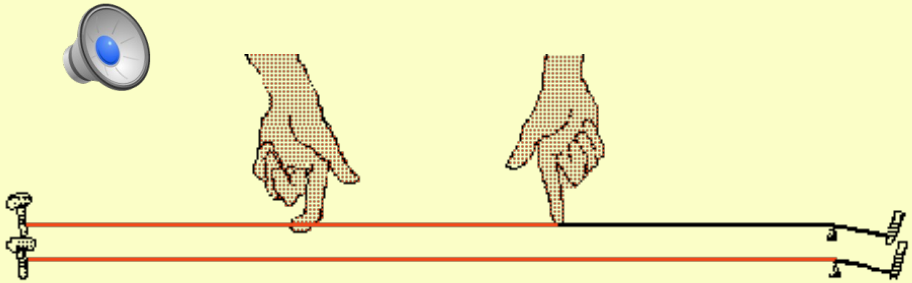
- Pitágoras (582 adC - 507 adC), a primeira escala musical



- Unha octava: 1:2

Música e matemáticas

- Un intervalo de quinta xusta



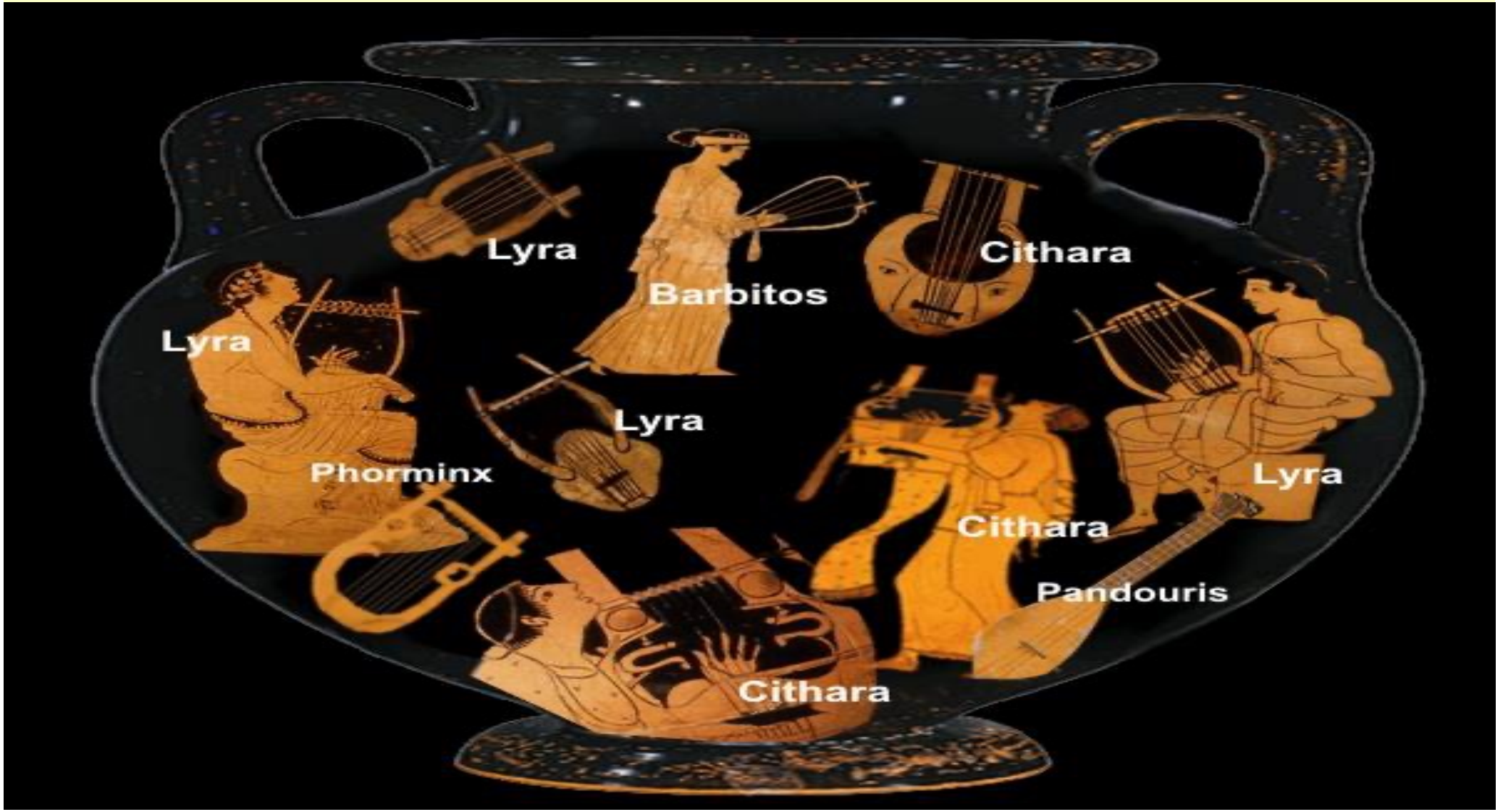
- 2:3

Música e matemáticas

- Un intervalo de cuarta xusta

- 3:4

1:2:3:4


Lyra
Barbitos
Cithara
Lyra
Lyra
Phorminx
Lyra
Cithara
Pandouris
Cithara

- Resonancia

A harmonía das esferas

- Ptolomeo
  Certas notas musicais corresponden a planetas, as distancias entre estes e os seus movementos.

- Planetas e estrelas

- Terra = 12.756 KM de diámetro
- Rigel, Betelgeuse
- Arturo, Sirio, Pollux, Antares
- Mu Cephei = 3.481.250.000 KM
- VV Cephei = 3.676.200.000 KM

- **Gracias!**
- **http://www.quiquemacias.tk**