Horizontes para ondas superficiais em fluidos

Alberto Saa

Buracos negros acústicos

- Introdução/Motivação
- Fundamentos hidrodinâmicos
- Horizontes para ondas superficiais

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Dívidas

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WIKIPEDIA
The Free Encyclopedia
Article
Talk
Dimensionless quantity
From Wikipedia, the free encyclopedia
(Redirected from Dimensionless number)
Main page
Contents
In dimensional analysis, a dimensionless quantity is a quantity

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WIKIPEDIA
The Free Encyclopedia

Main page
Contents

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In dimensional analysis, a **dimensionless quantity** is a quantity

List of dimensionless quantities [edit]

All numbers are dimensionless quantities. Certain dimensionless quantities of some importance are given below:

Name	Standard symbol	Definition	Field of application
Abbe number	*V*	$V = \frac{n_d - 1}{n_F - n_C}$	optics (dispersion in optical materials)
Activity coefficient	γ	$\gamma = \frac{a}{x}$	chemistry (Proportion of "active" molecules or atoms)
Albedo	α	$\alpha = (1 - D)\bar{\alpha}(\theta_i) + D\bar{\bar{\alpha}}$	climatology, astronomy (reflectivity of surfaces or bodies)
Archimedes number	Ar	$\mathrm{Ar} = \frac{g L^3 \rho_\ell (\rho - \rho_\ell)}{\mu^2}$	fluid mechanics (motion of fluids due to density differences)
Arrhenius number	α	$\alpha = \frac{E_a}{RT}$	chemistry (ratio of activation energy to thermal energy)[5]
Atomic weight	*M*		chemistry (mass of atom over one atomic mass unit, u, where carbon-12 is exactly 12 u)

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Bond number	Bo	$\mathrm{Bo} = \frac{\rho a L^2}{\gamma}$	geology, fluid mechanics, porous media (buoyant versus capilary forces, similar to the Eötvös number) [10]
Eötvös number	Eo	$\mathrm{Eo} = \frac{\Delta\rho\, g\, L^2}{\sigma}$	fluid mechanics (shape of bubbles or drops)

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WIKIPEDIA
The Free Encyclopedia
Article
Talk
Phase velocity
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Article Talk

Phase velocity

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Article Talk

Group velocity

From Wikipedia, the free encyclopedia

$$v_g \equiv \frac{\partial \omega}{\partial k}$$

Ondas de superfície

Fluido incompressível

$$\frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial z^2} = 0$$

Condições de contorno

$$\mathbf{v}\cdot\hat{\mathbf{k}} = \left.\frac{\partial\psi}{\partial z}\right|_{z=-h} = 0$$

$$\left.\frac{\partial\psi}{\partial z}\right|_{z=0} = \frac{\partial\xi}{\partial t}$$

$$g\zeta + \left.\left(\frac{\partial\psi}{\partial t}\right)\right|_{z=0} = 0$$

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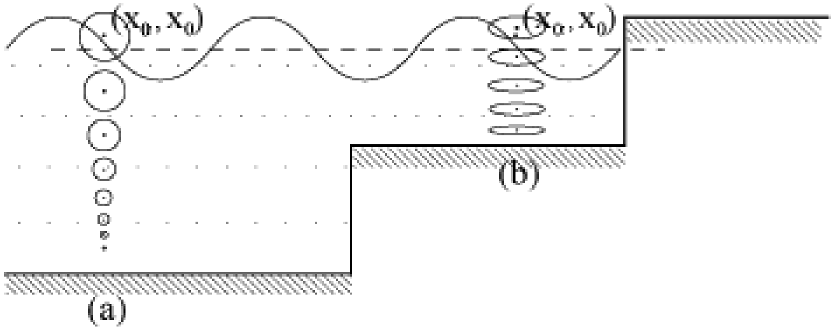

Figura 4 - Trajetórias das partículas em (a) águas profundas e
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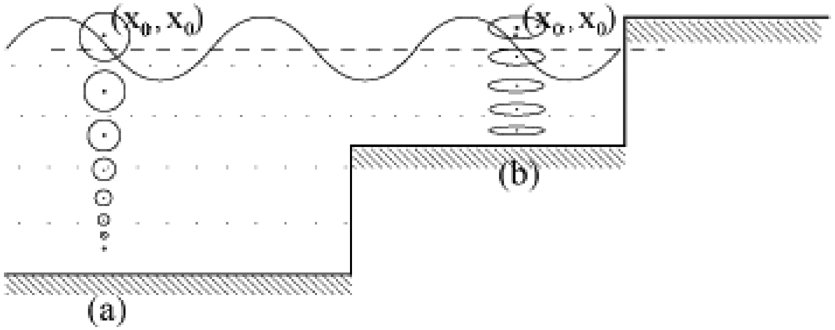

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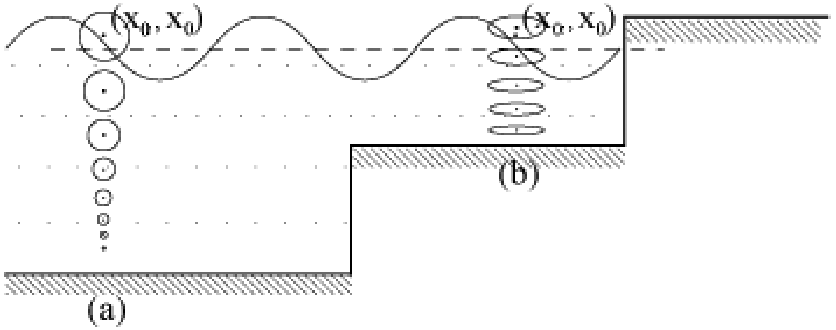

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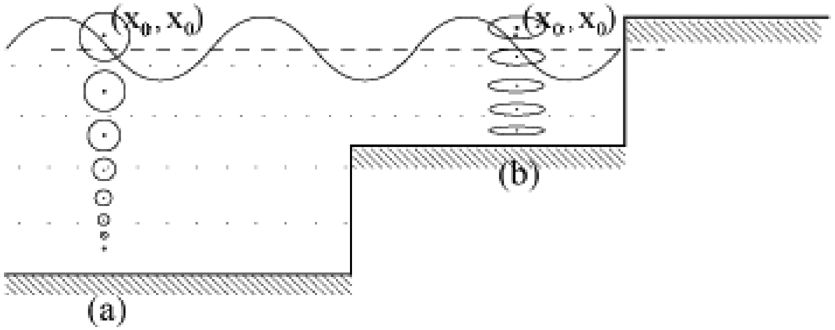

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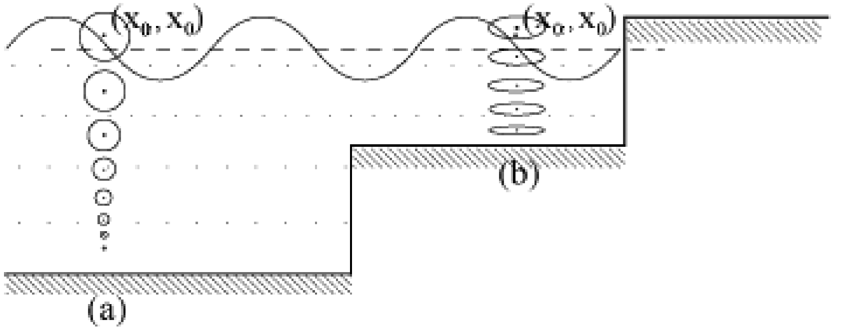

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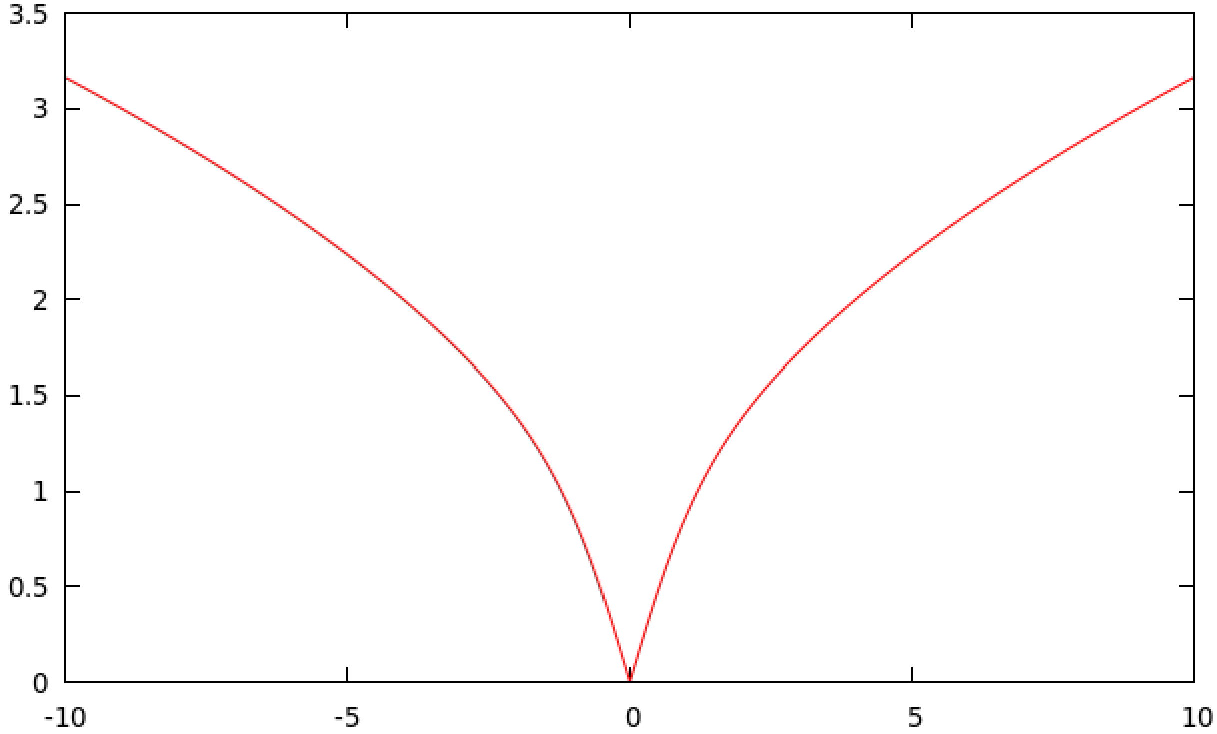

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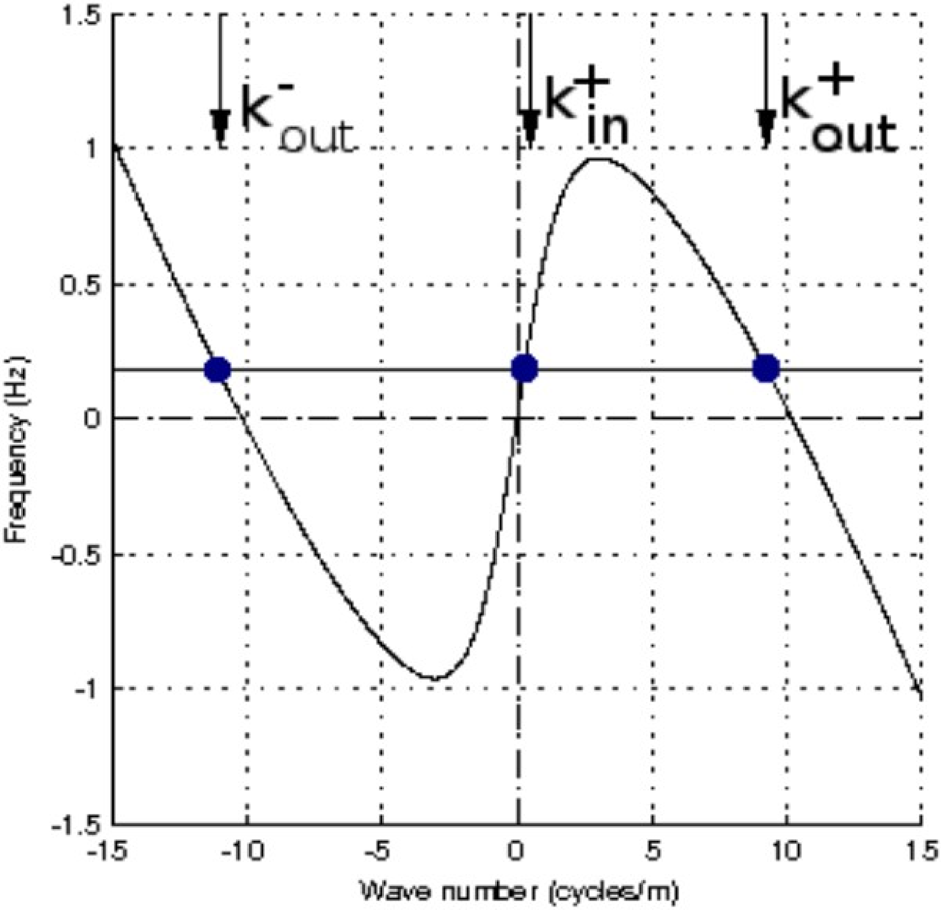

$$(\omega(k) + kv)^2 = kg \tanh(kh)$$

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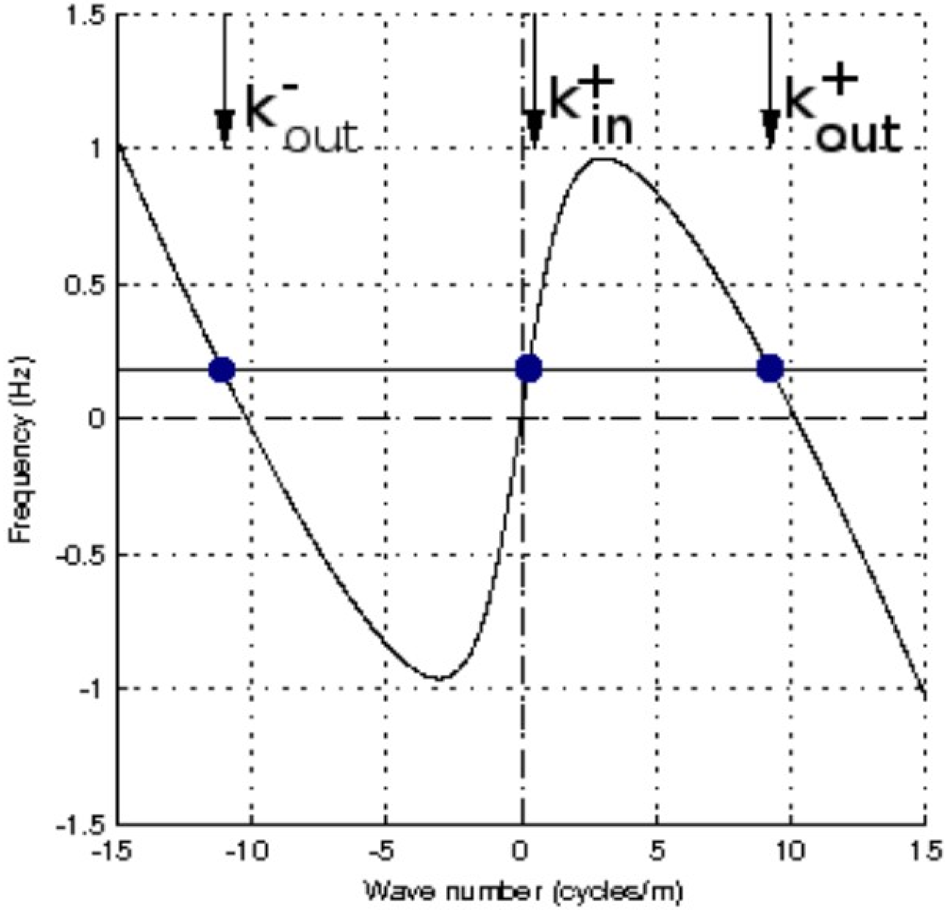

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Silke Weinfurtner[1], Edmund W. Tedford[2], Matthew C. J. Penrice[1], William G. Unruh[1], and Gregory A. Lawrence[2]

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[2]Department of Civil Engineering, University of British Columbia, 6250 Applied Science Lane, Vancouver, Canada V6T 1Z4

Espalhamento por BN

$$ds^2 = -\left(1 - \frac{2M}{r}\right)dt^2 + \frac{dr^2}{1 - \frac{2M}{r}} + r^2 d\Omega^2$$

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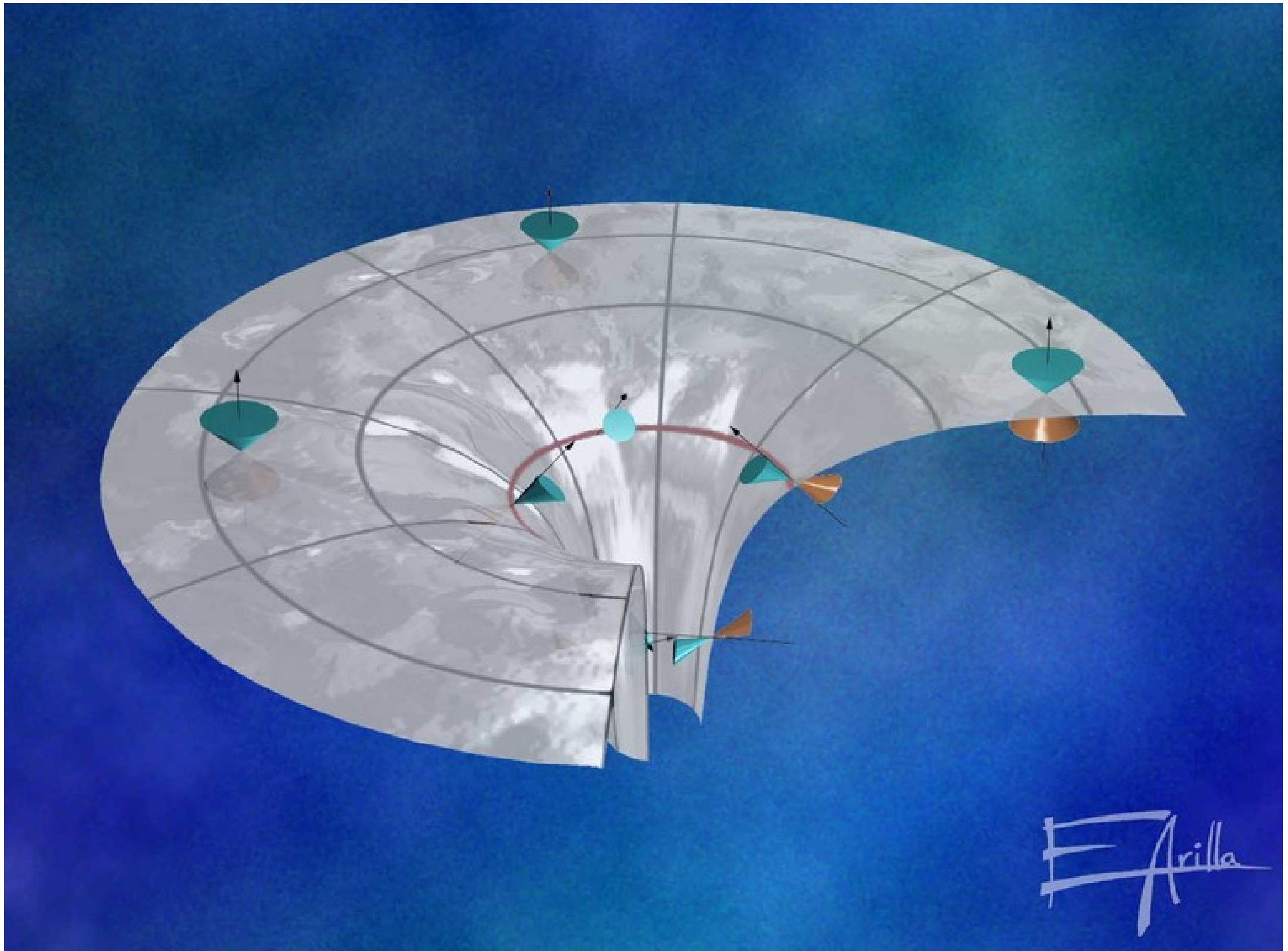

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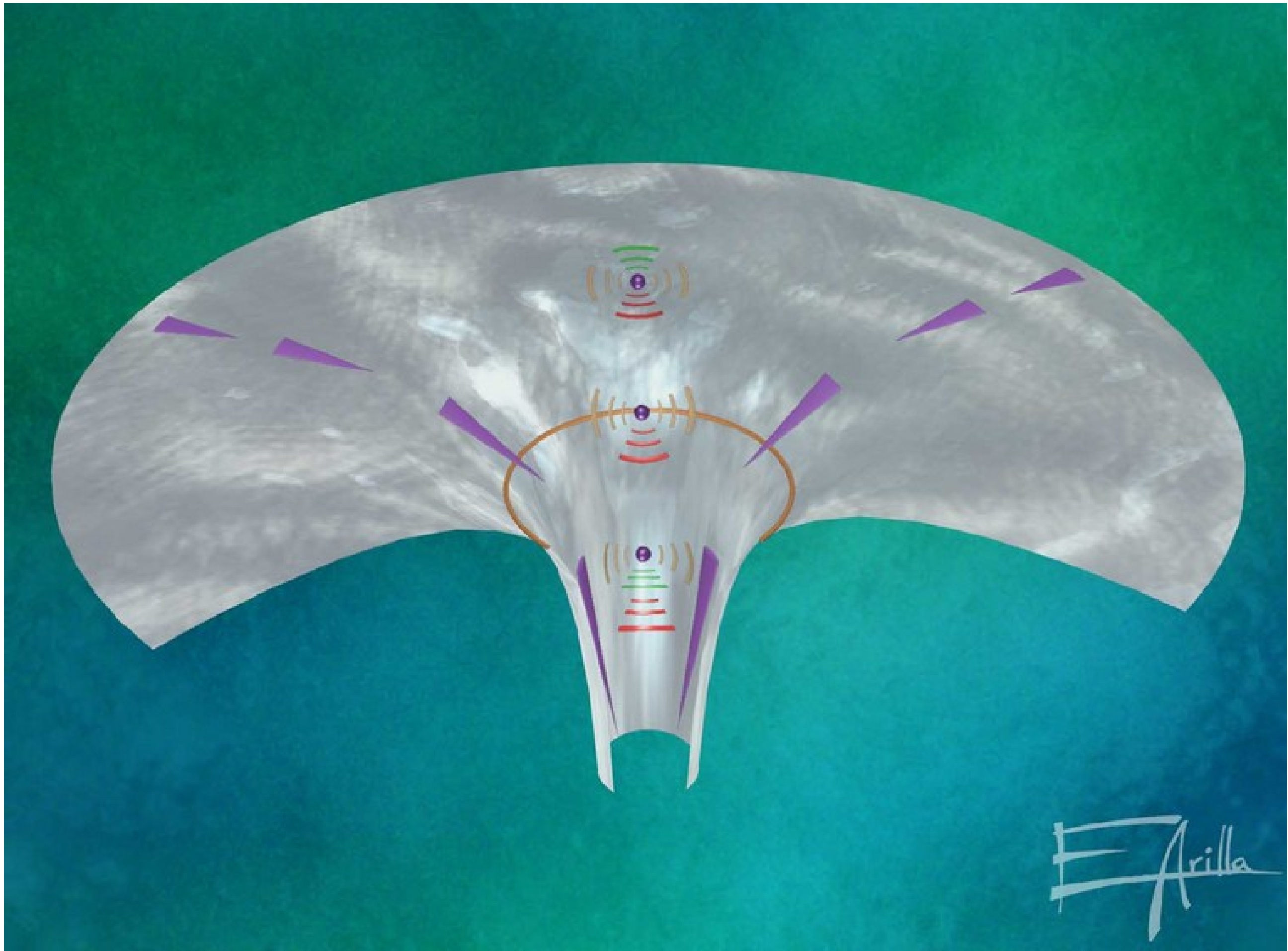

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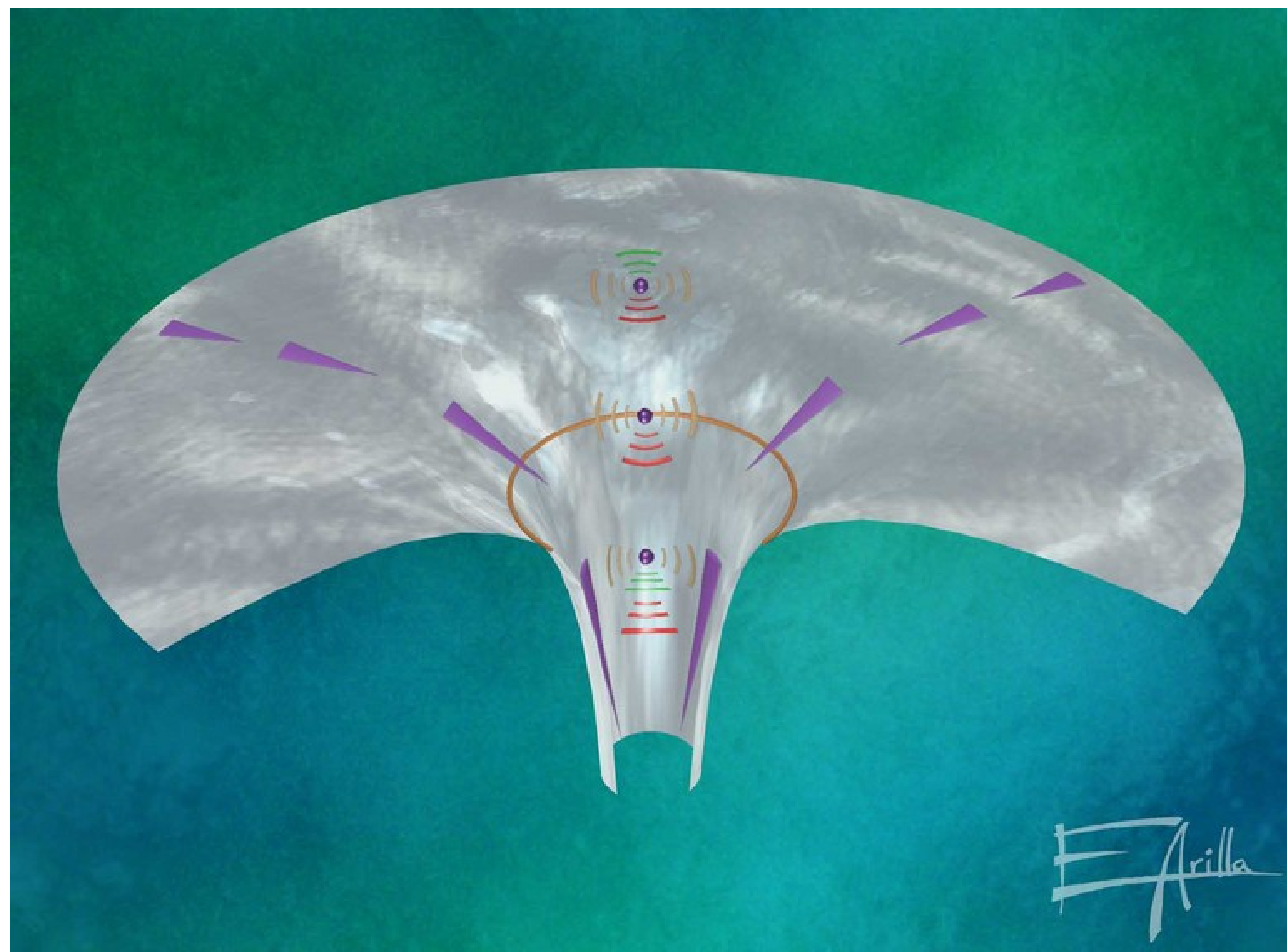

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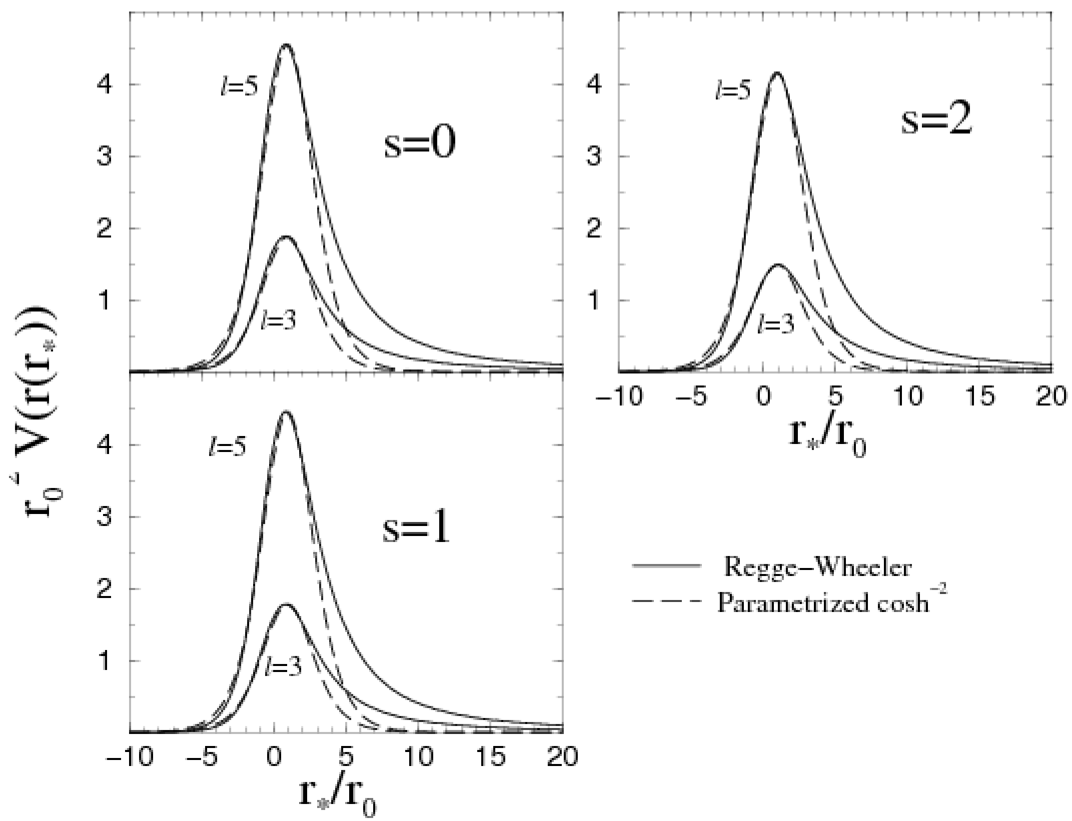

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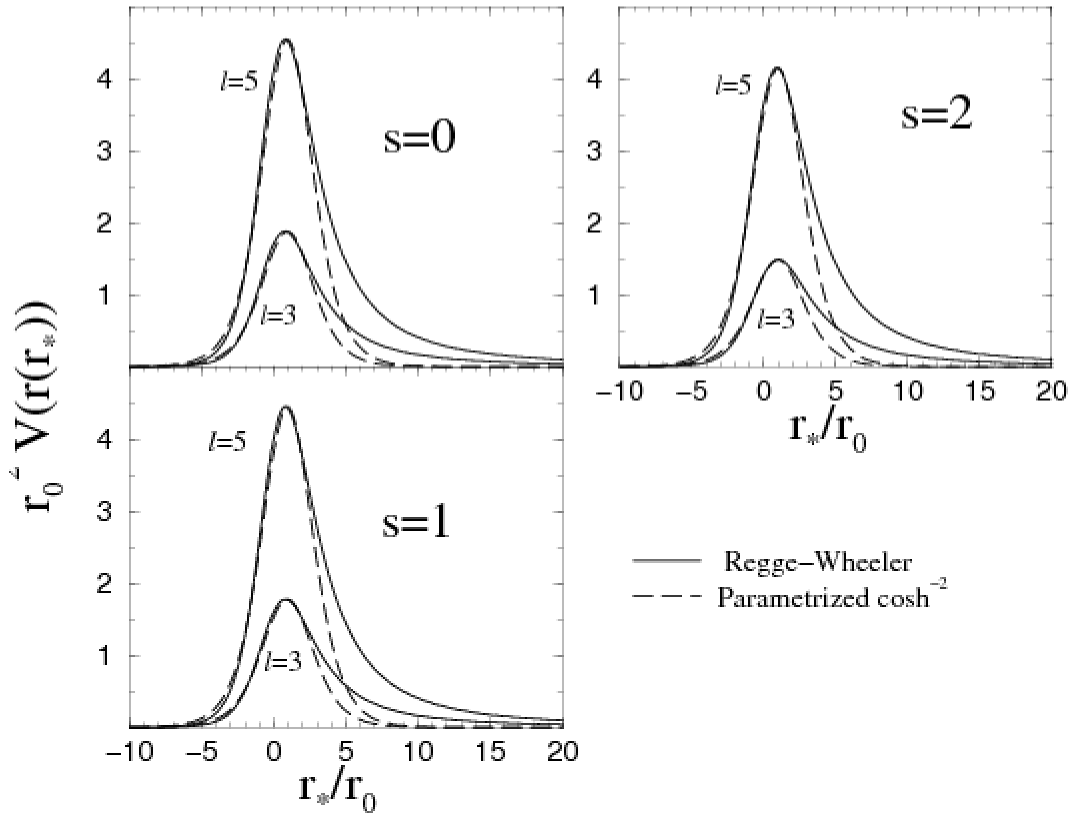

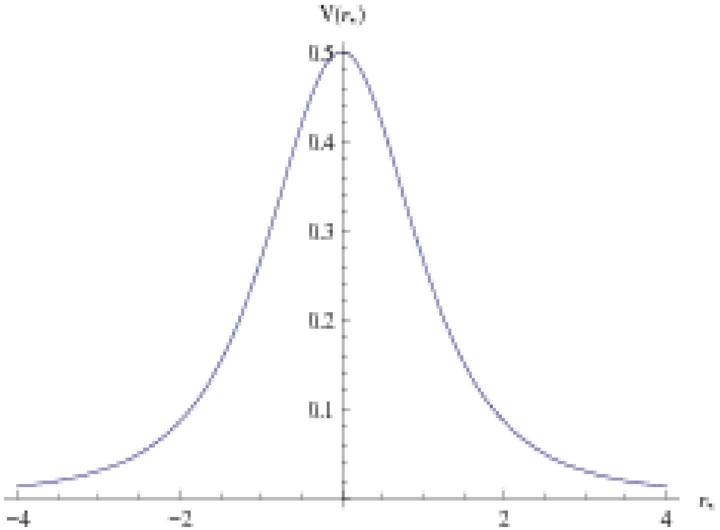

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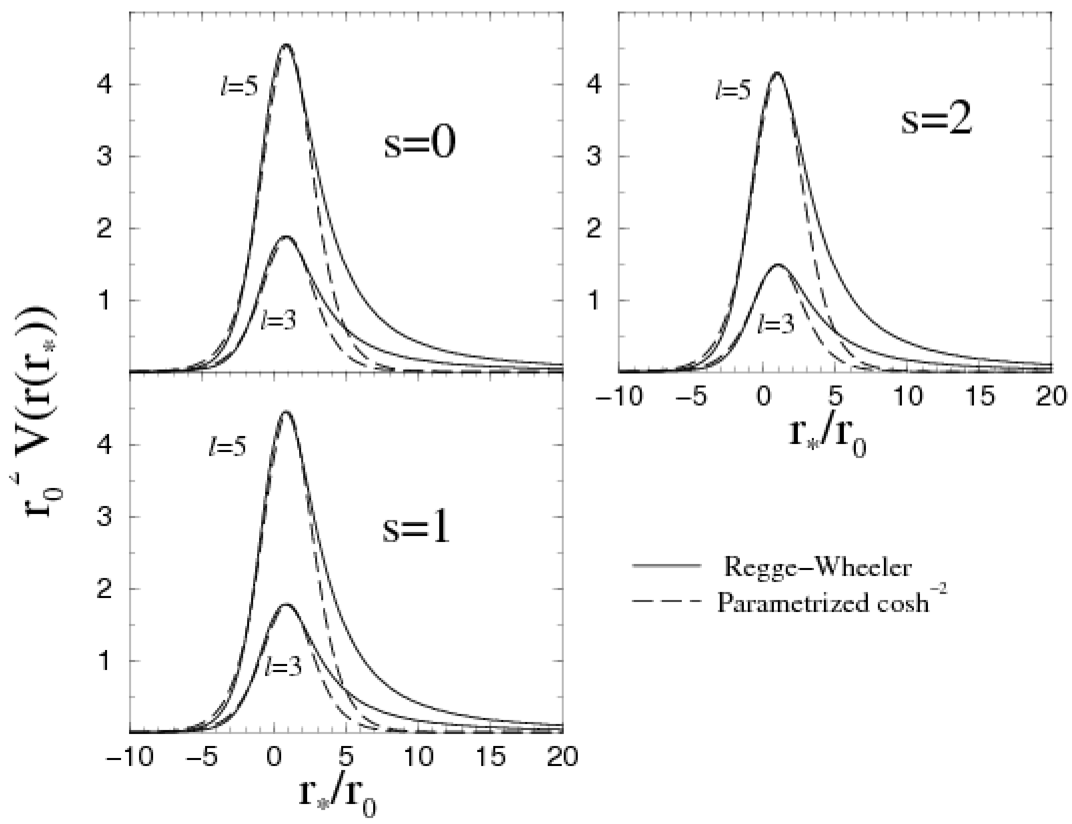

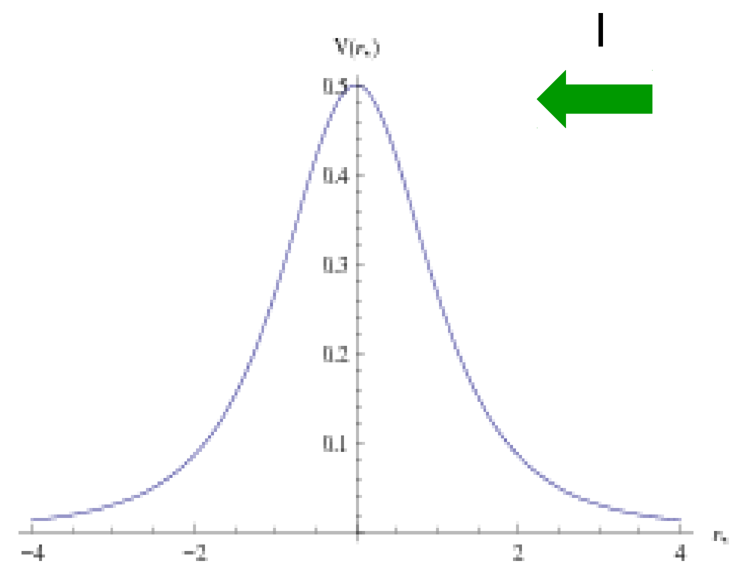

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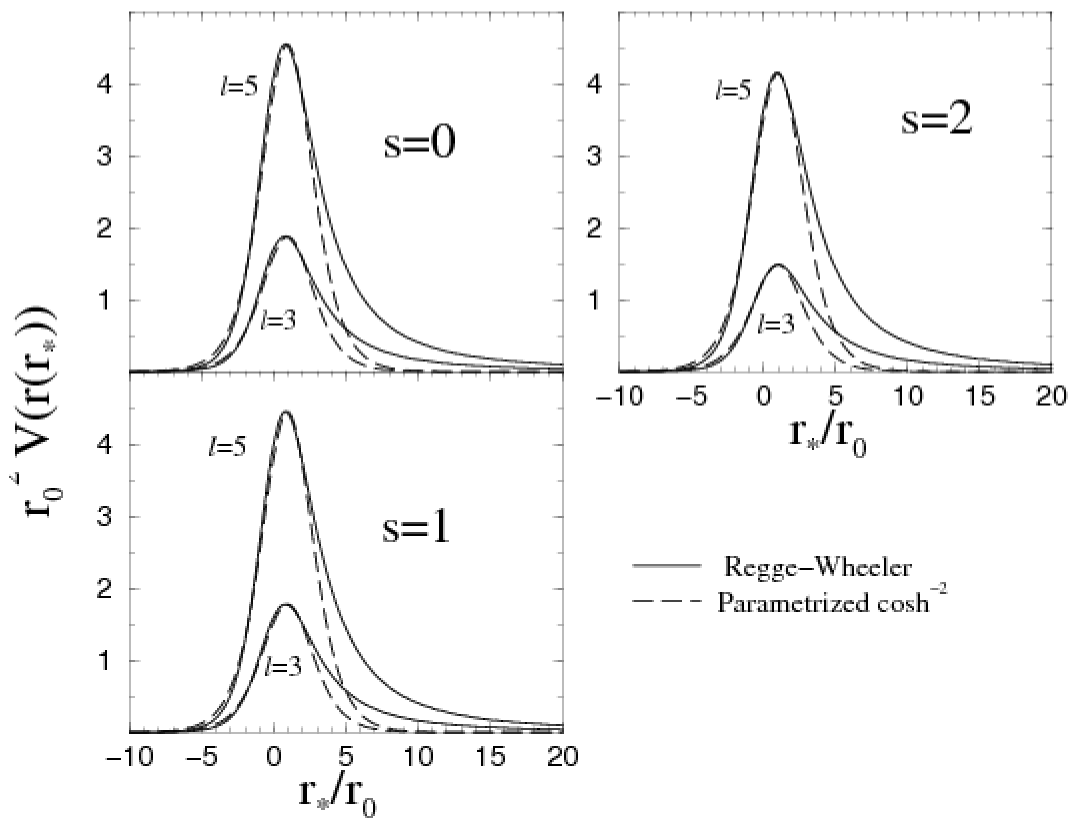

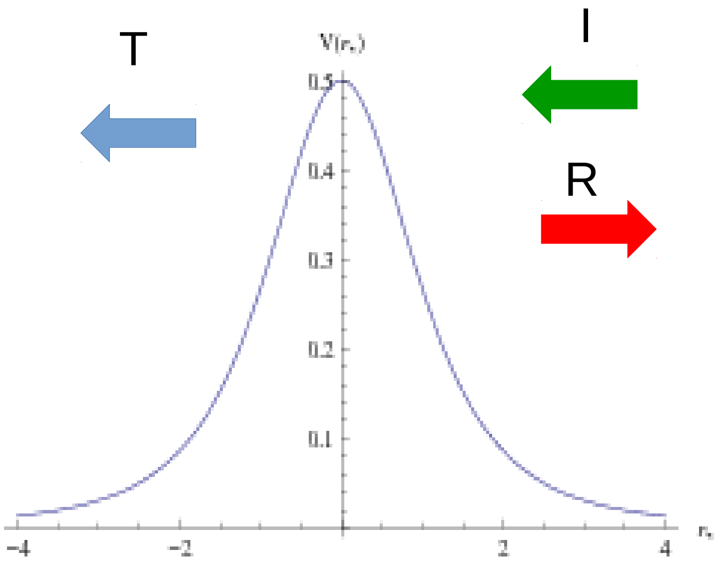

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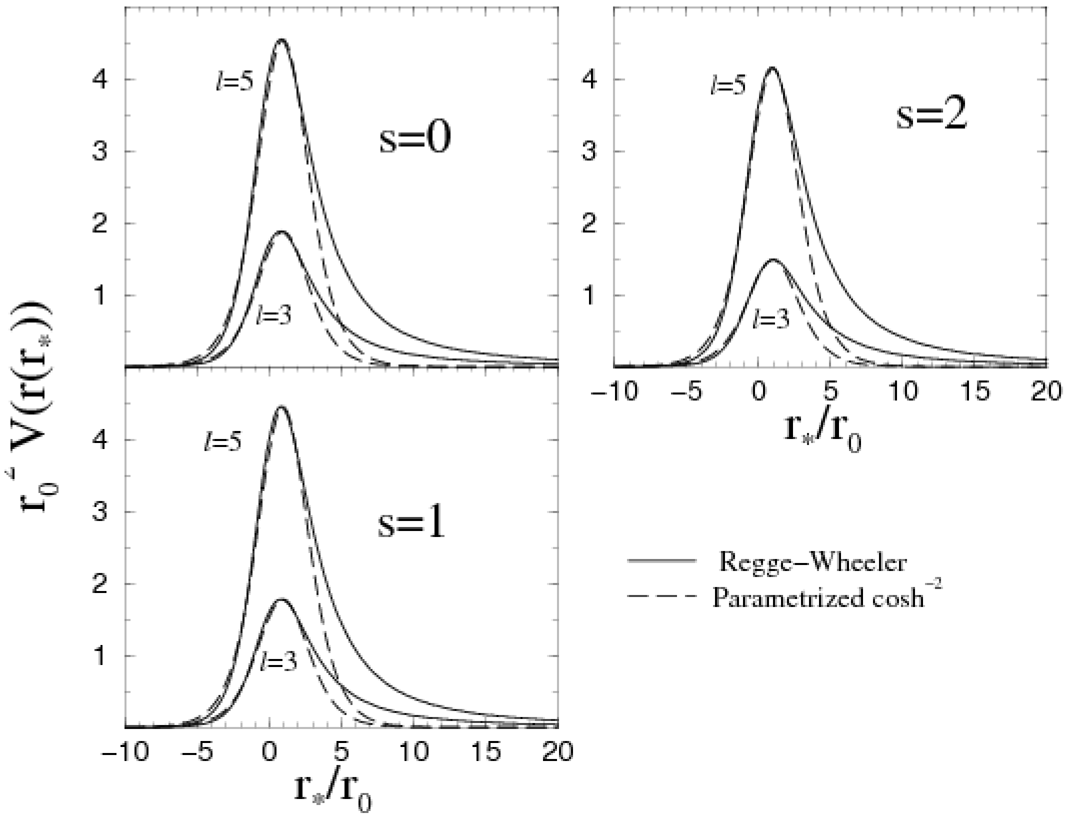

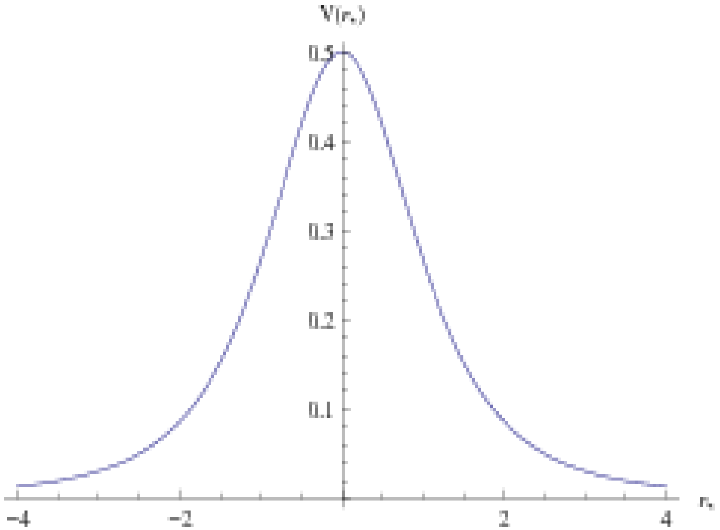

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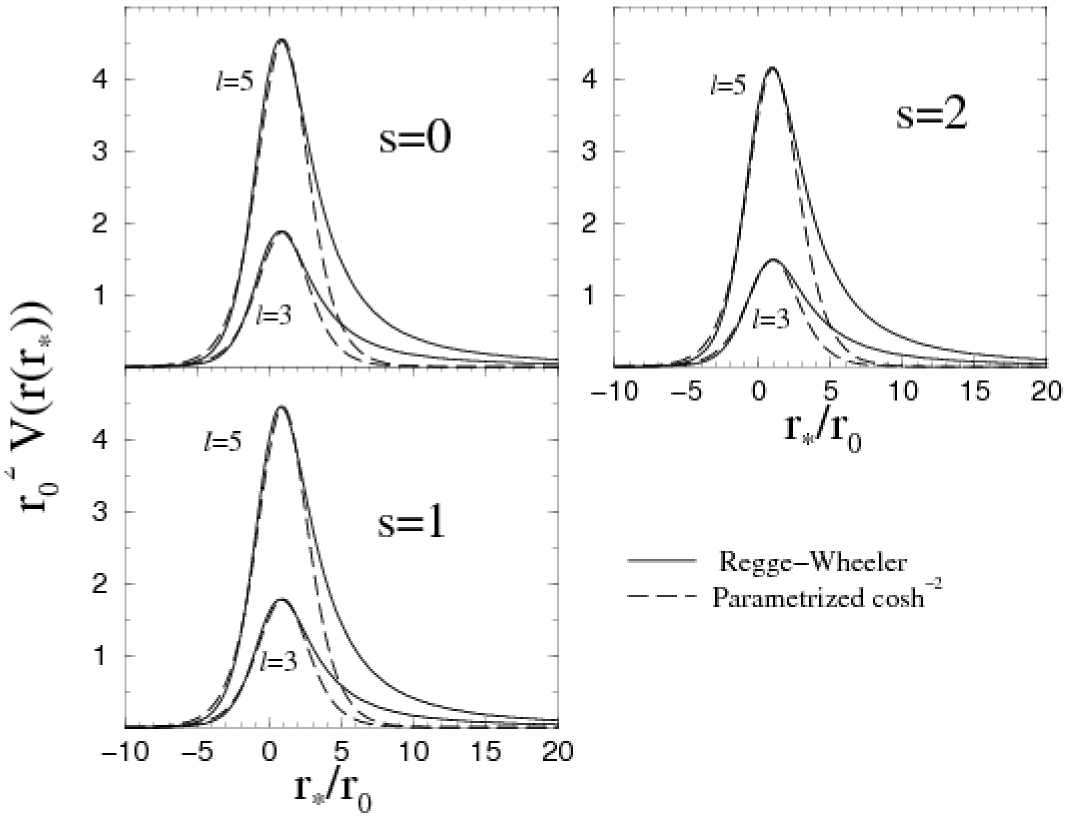

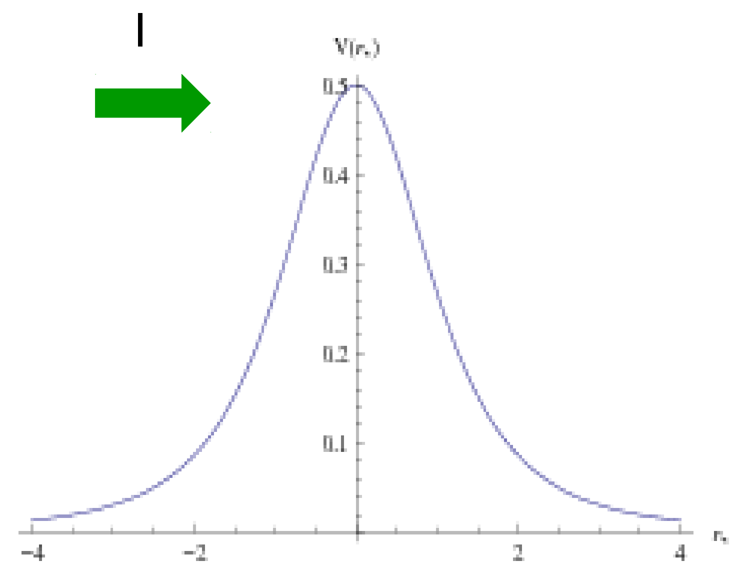

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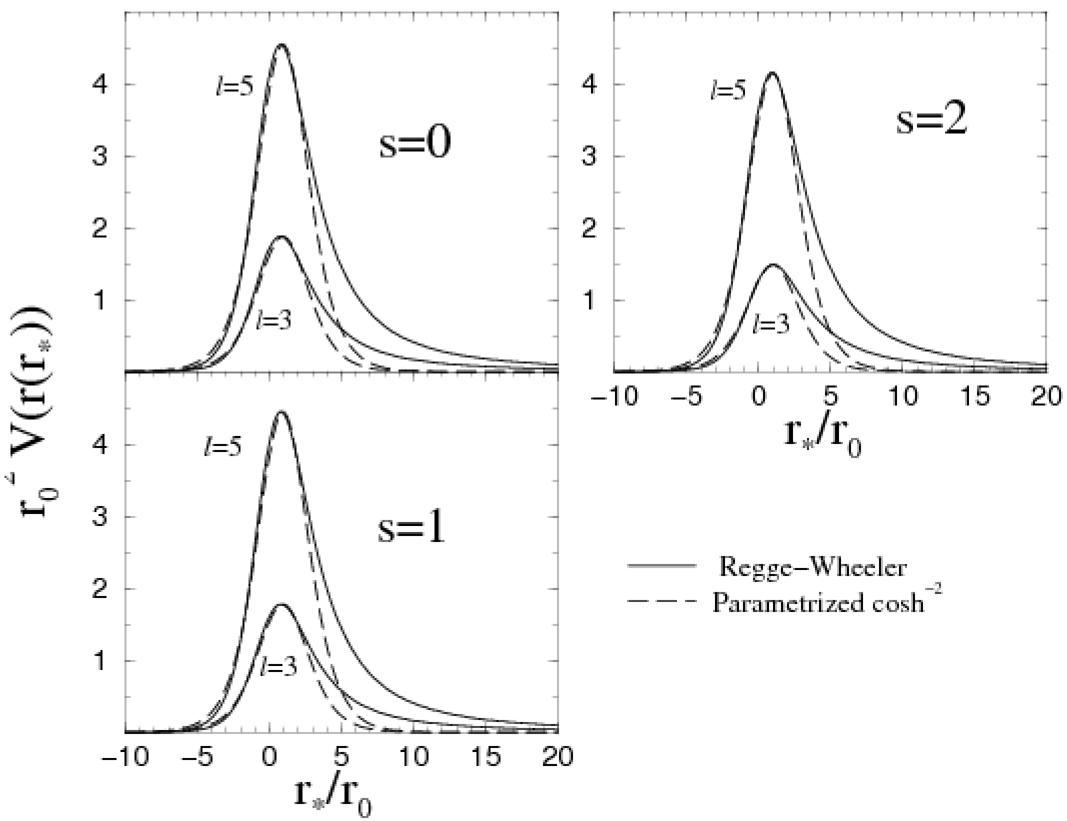

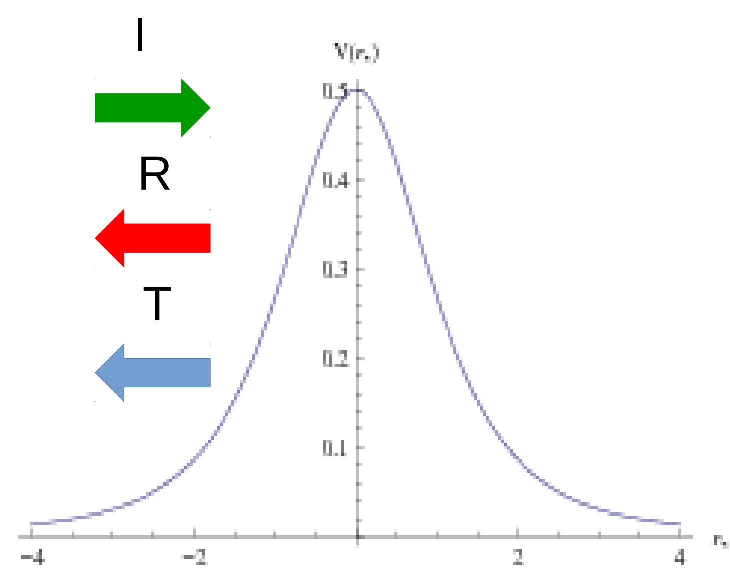

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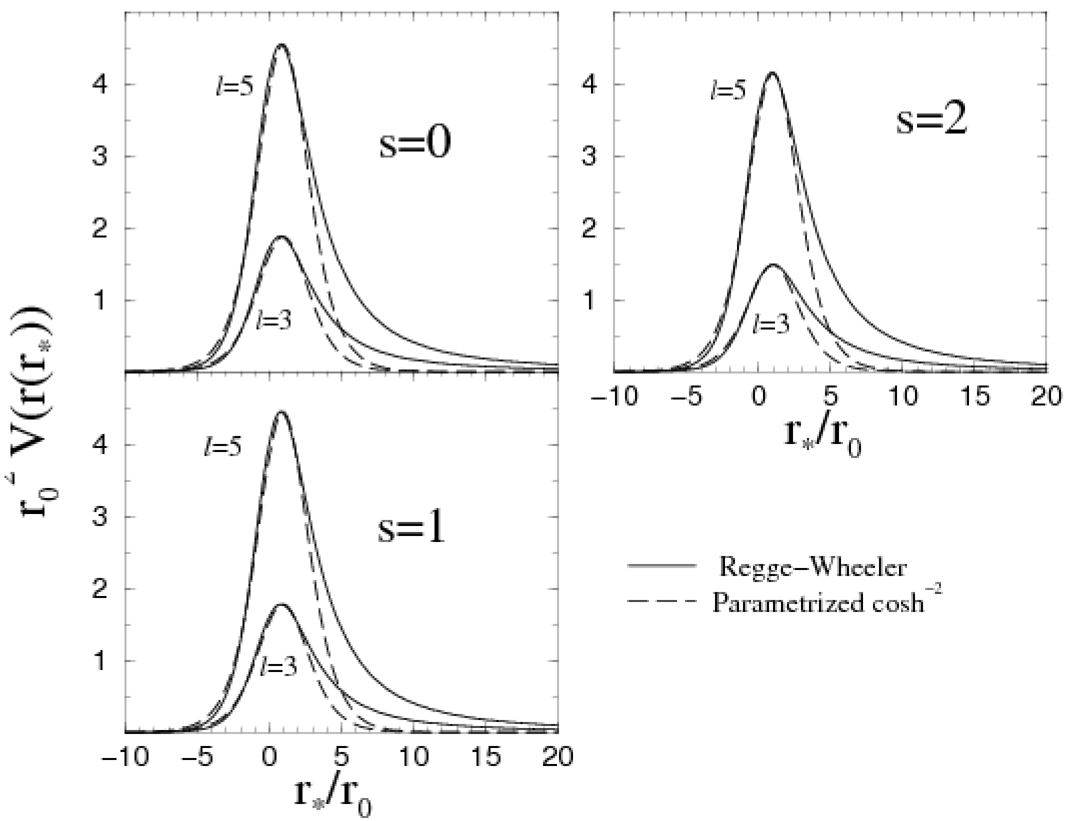

Transformação de Bogolubov

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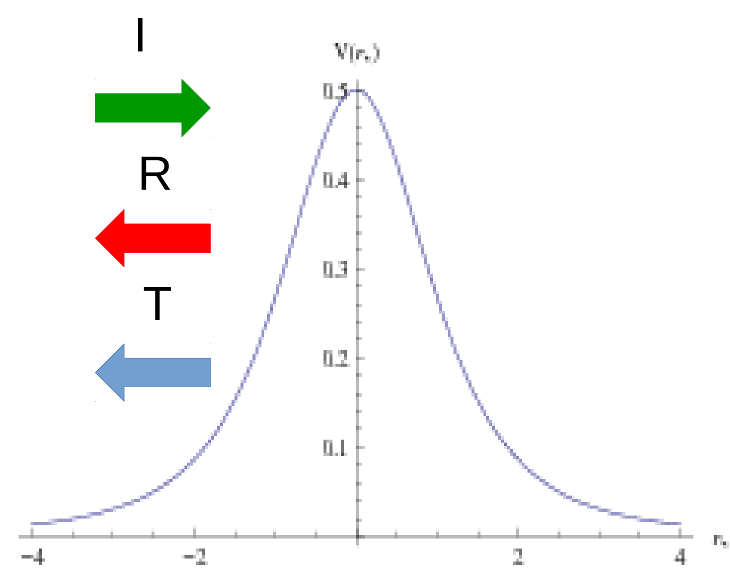

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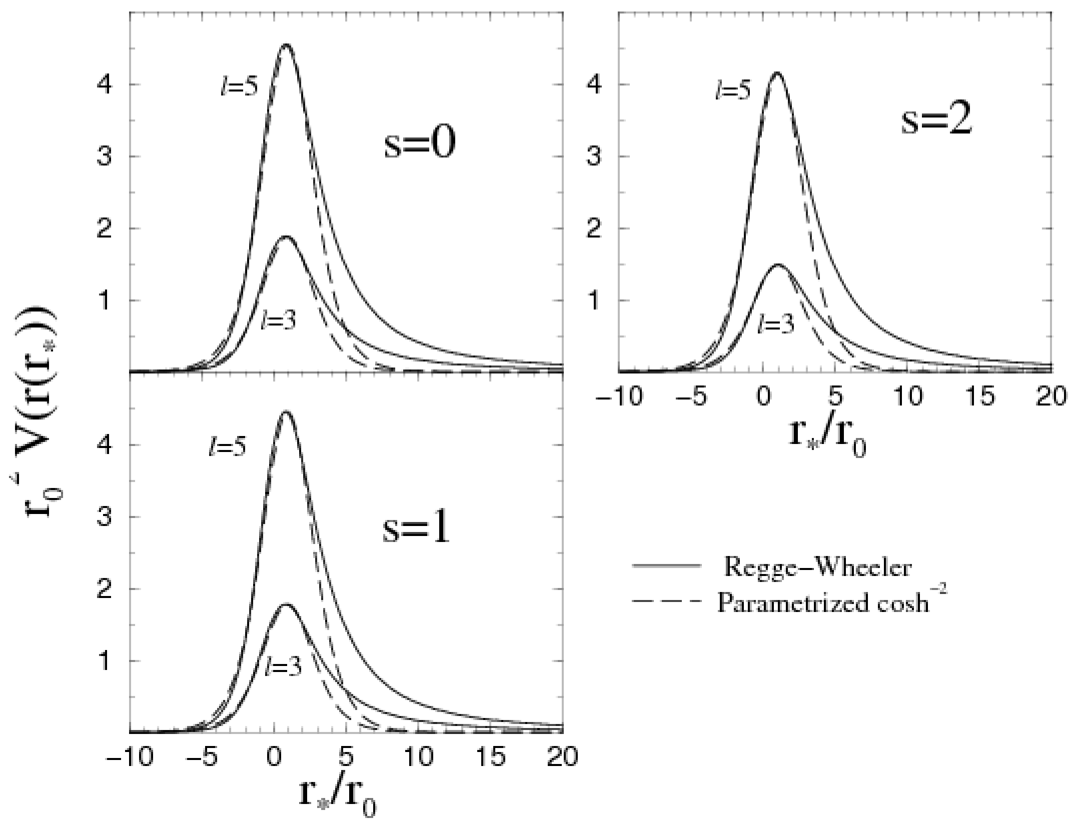

Radiação de Hawking

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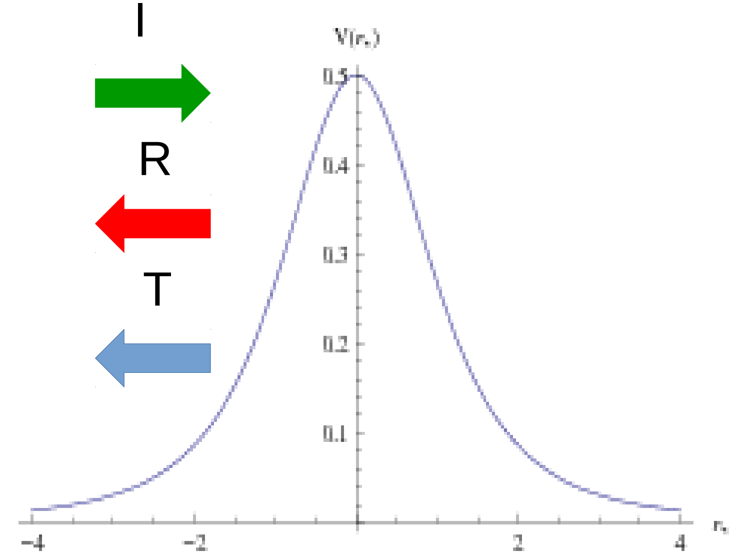

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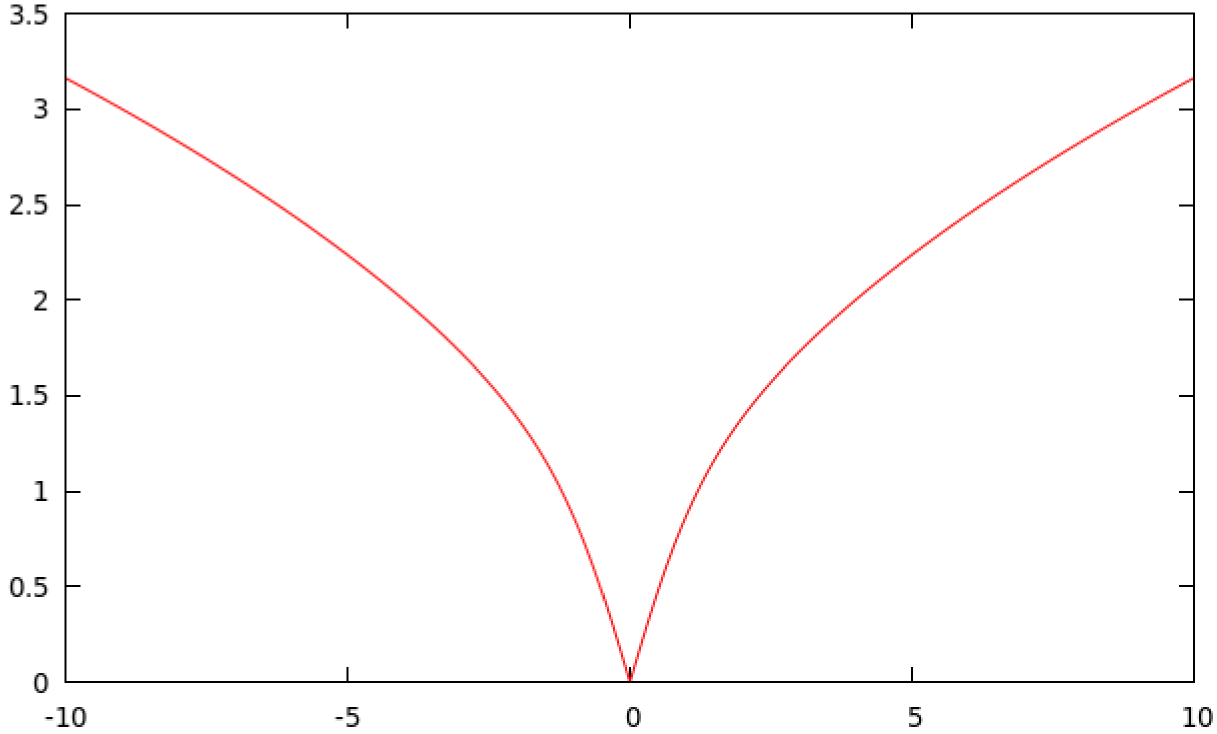

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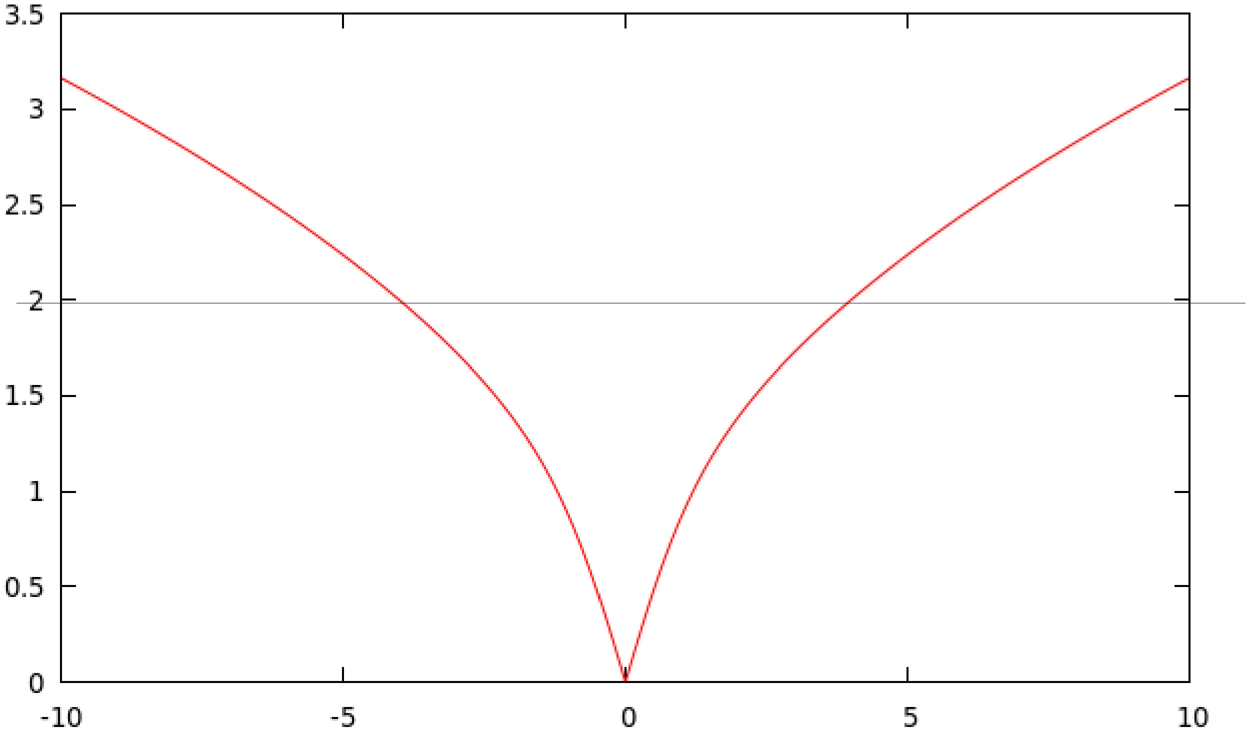

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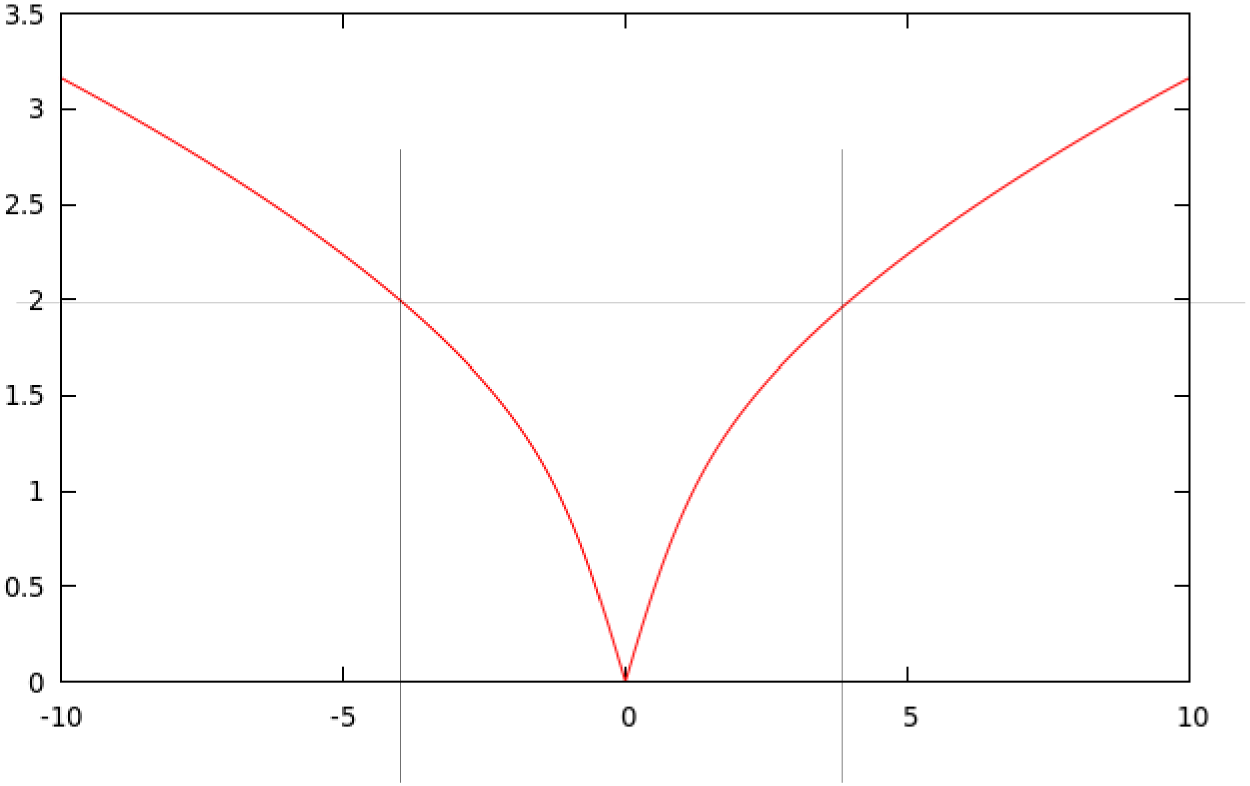

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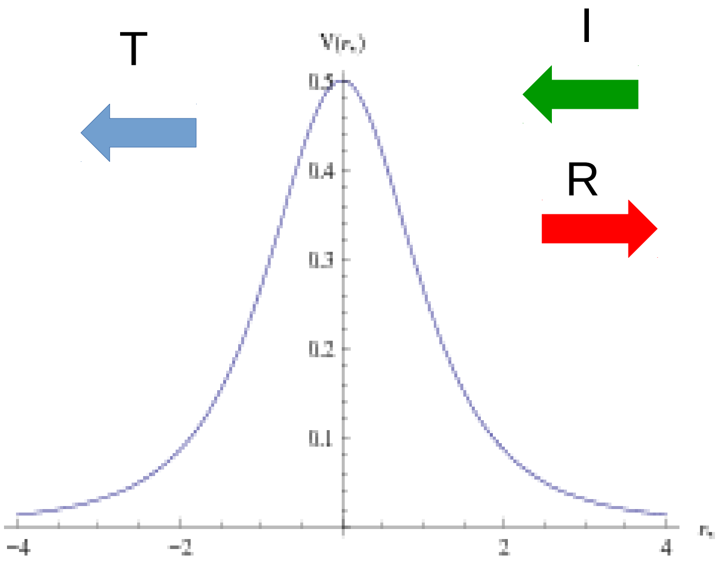

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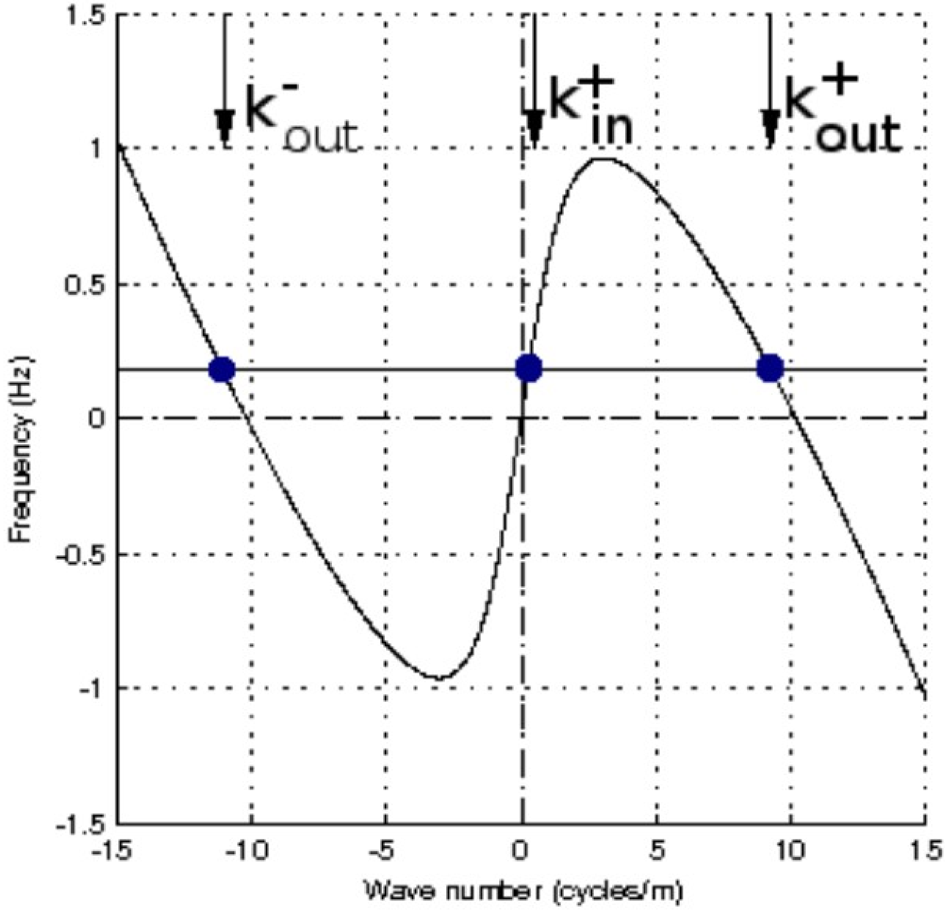

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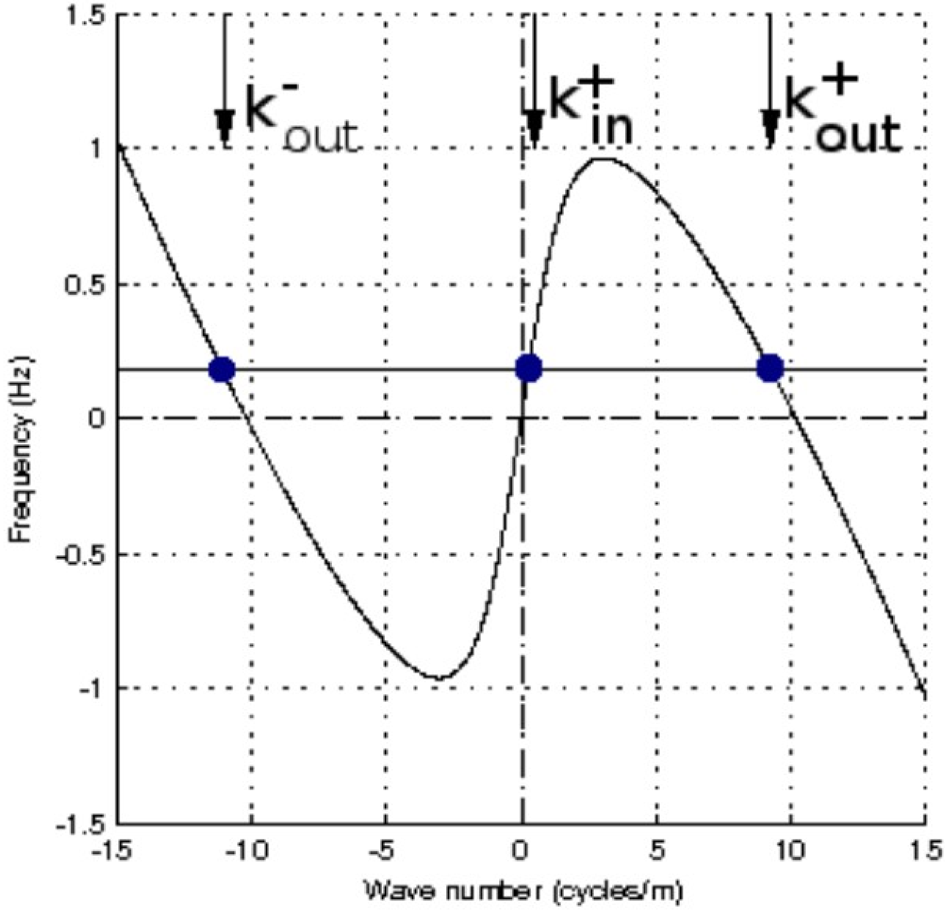

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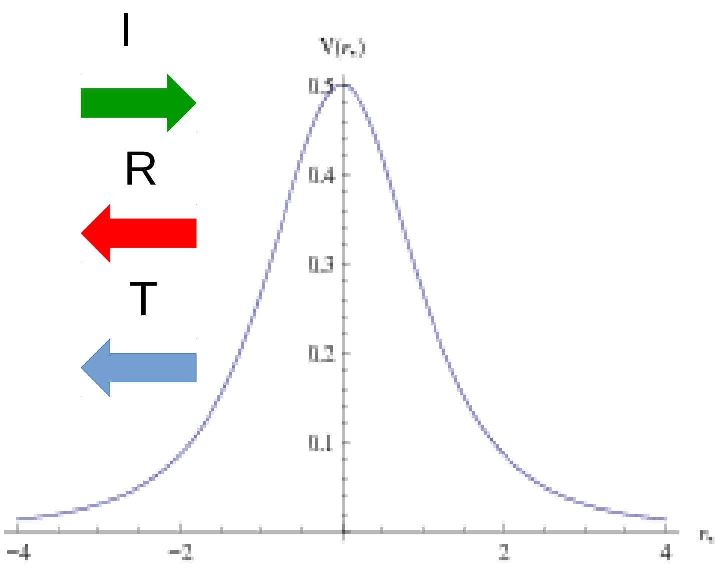

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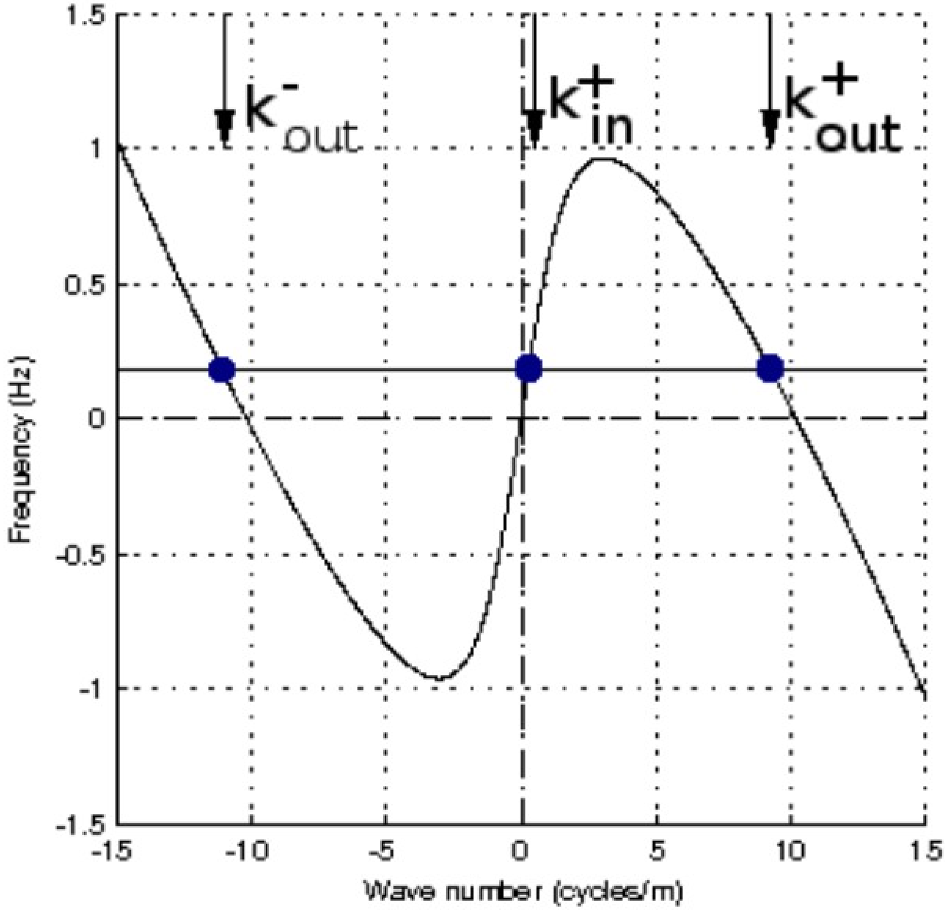

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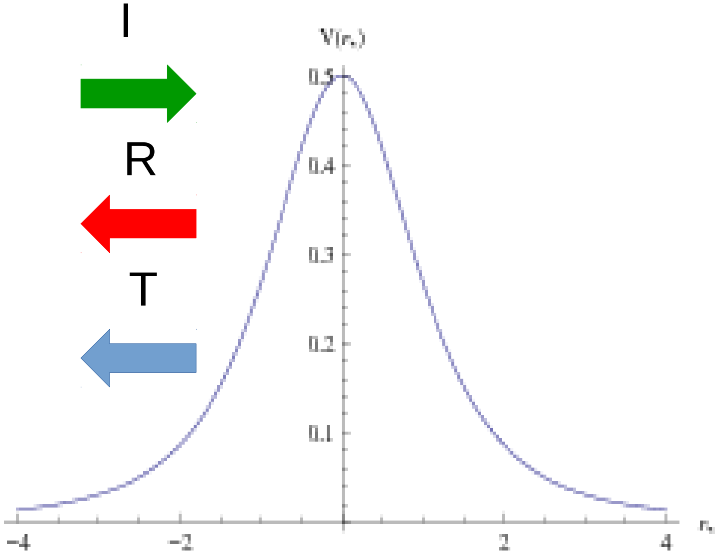

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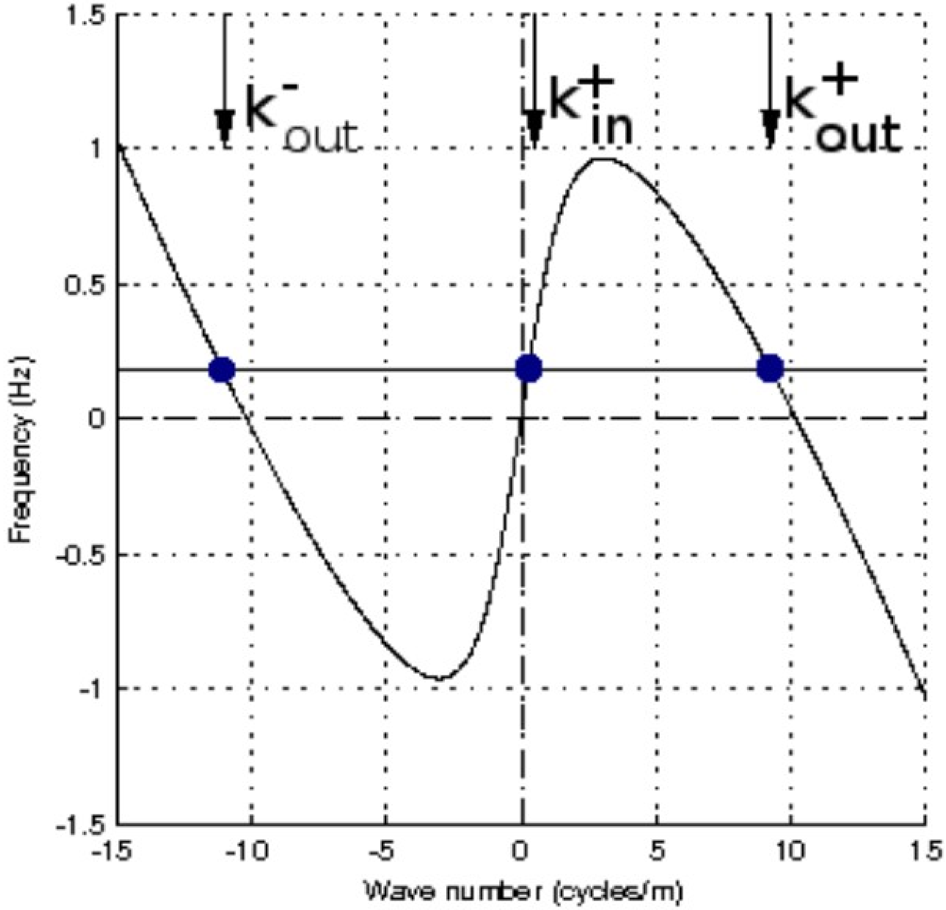

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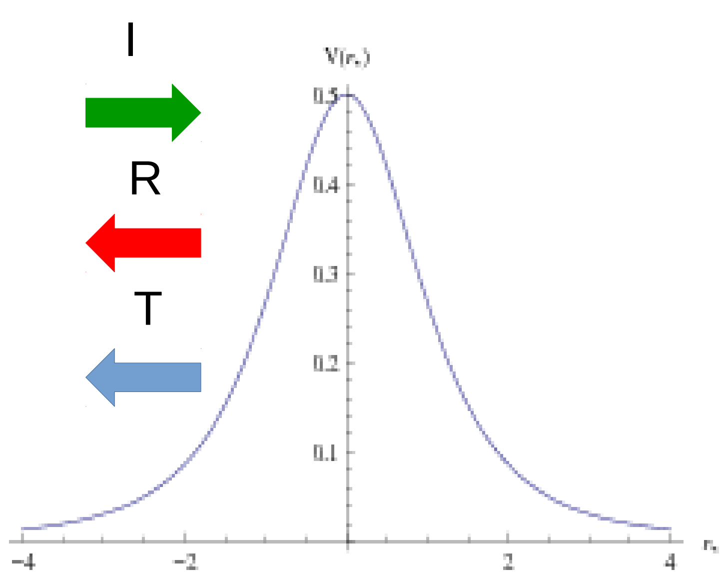
Transformação de Bogolubov

$$\frac{|\beta_f|^2}{|\alpha_f|^2}$$



Experimento

Experiment procedures

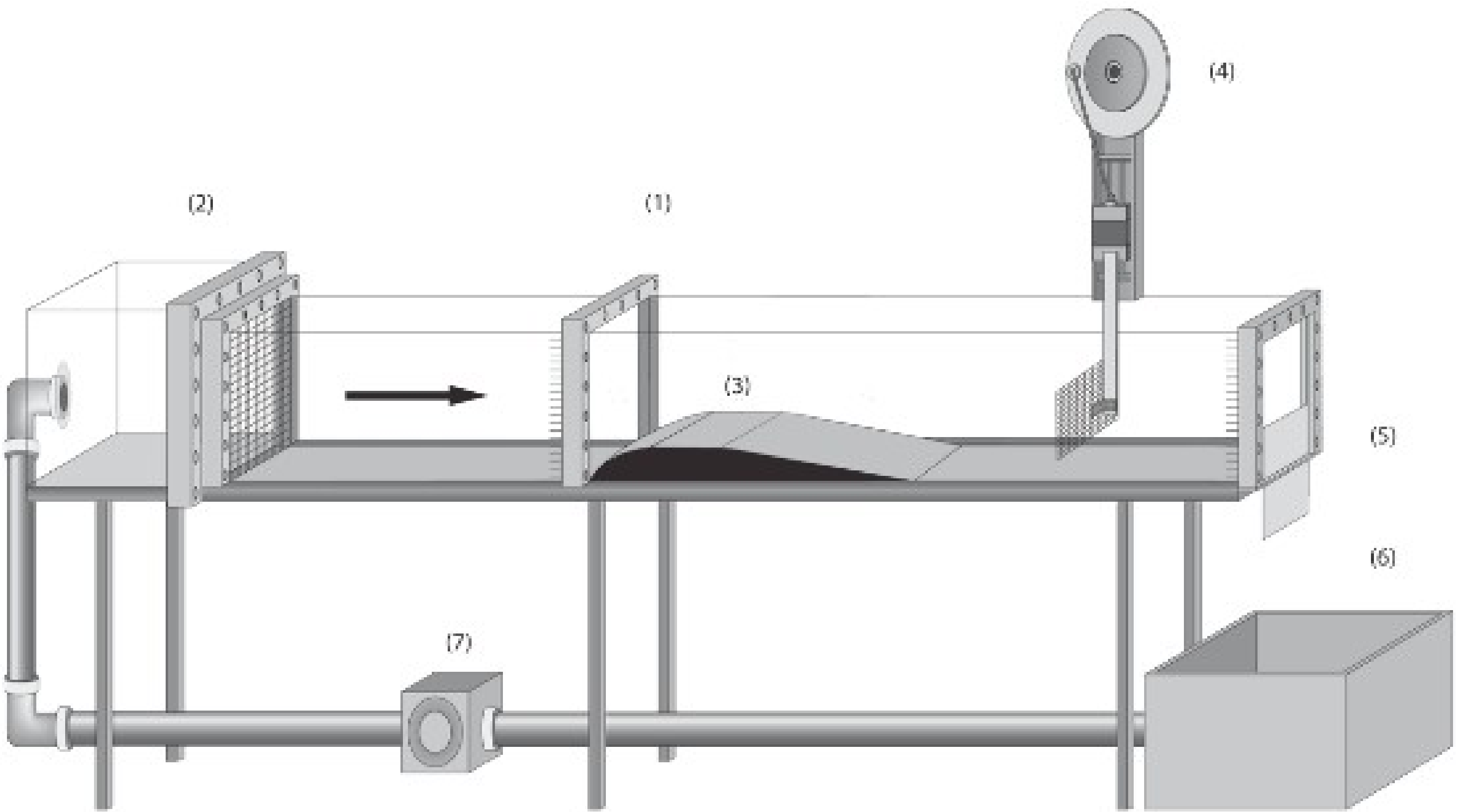
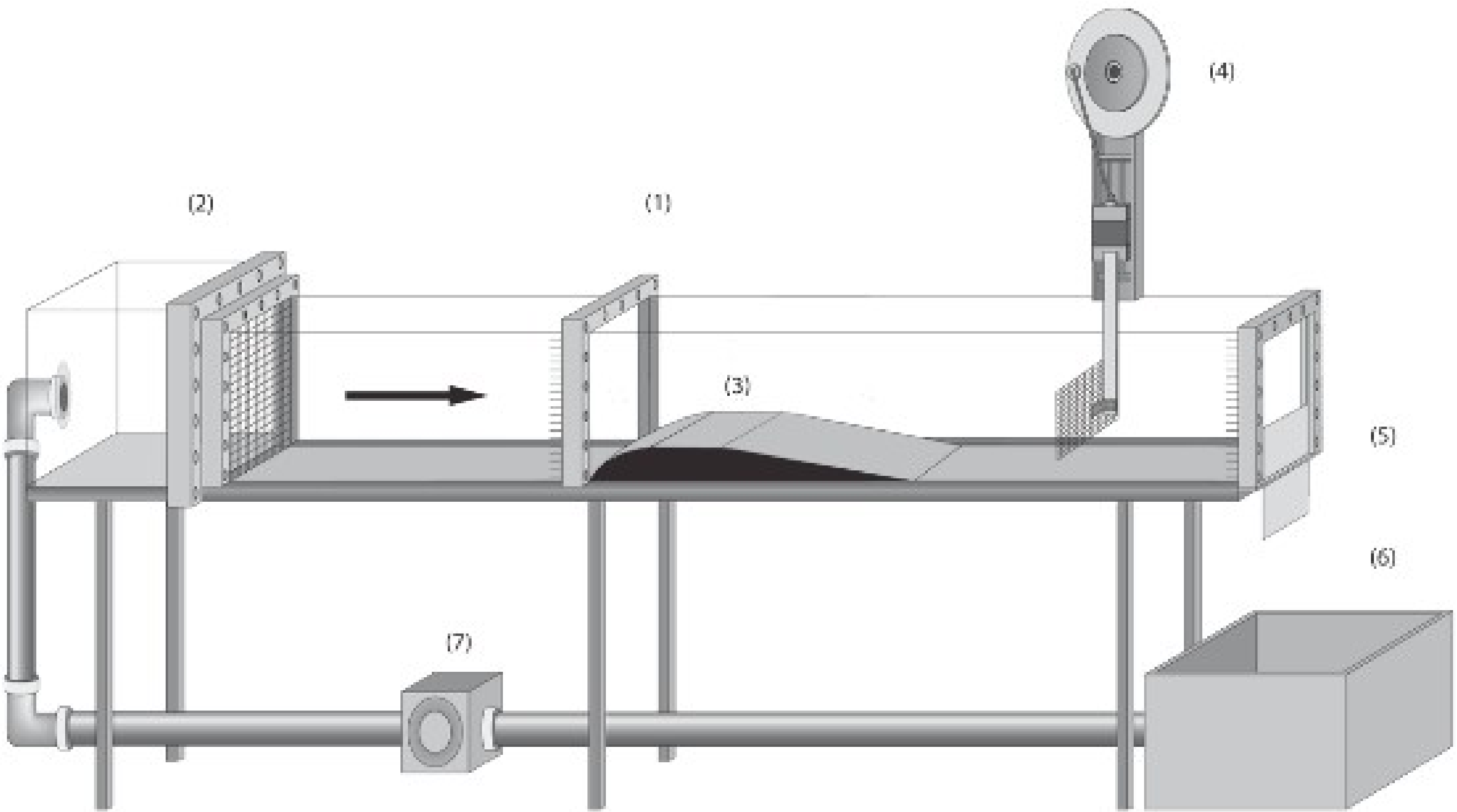


Figure 2 | Experimental apparatus. The experimental apparatus used in our experiments: (1) flume, (2) intake reservoir, (3) obstacle, (4) wave generator, (5) adjustable weir, (6) holding reservoir, and (7) pump and pump valve.

Experimento

Experiment procedures



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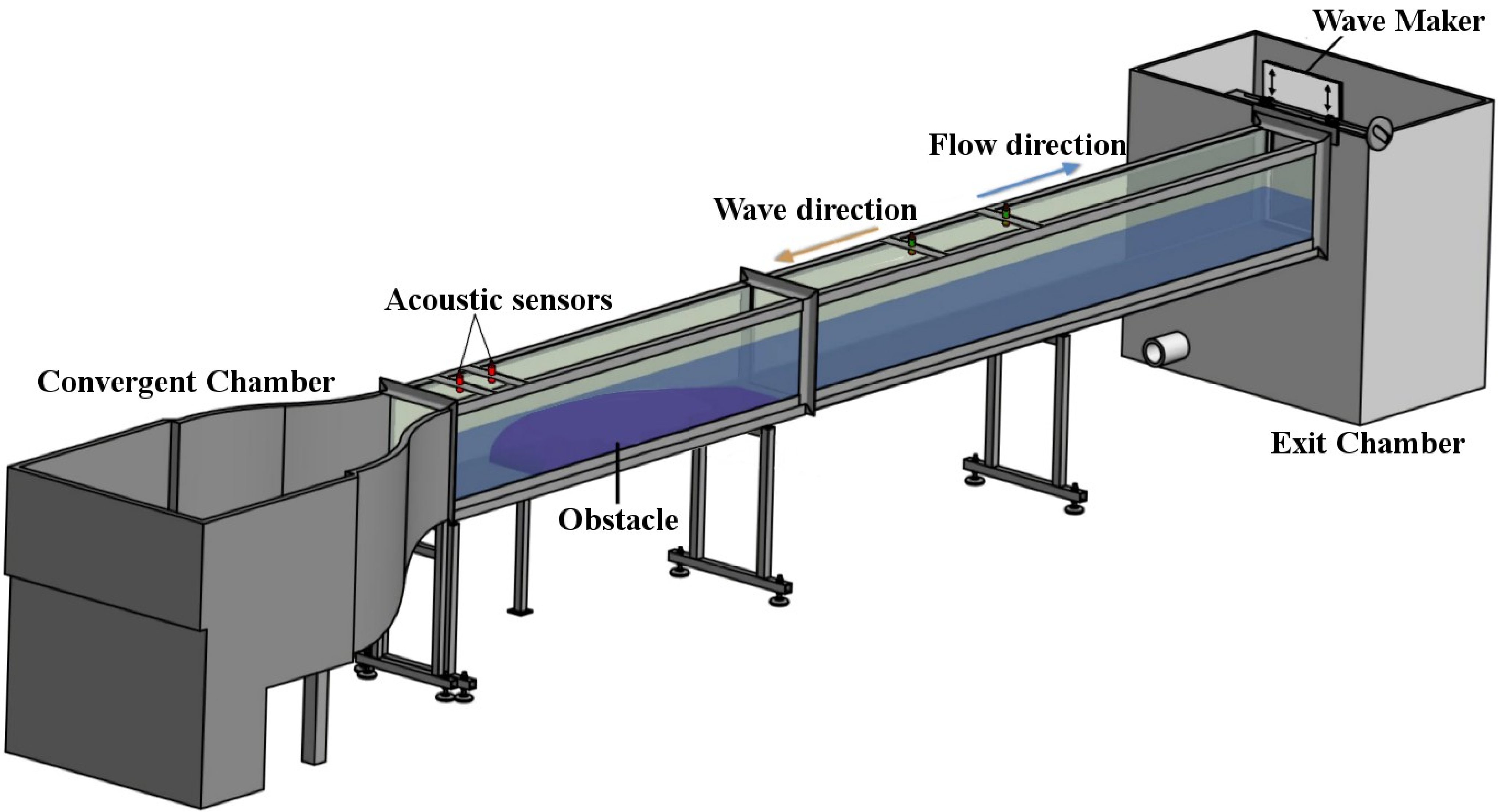
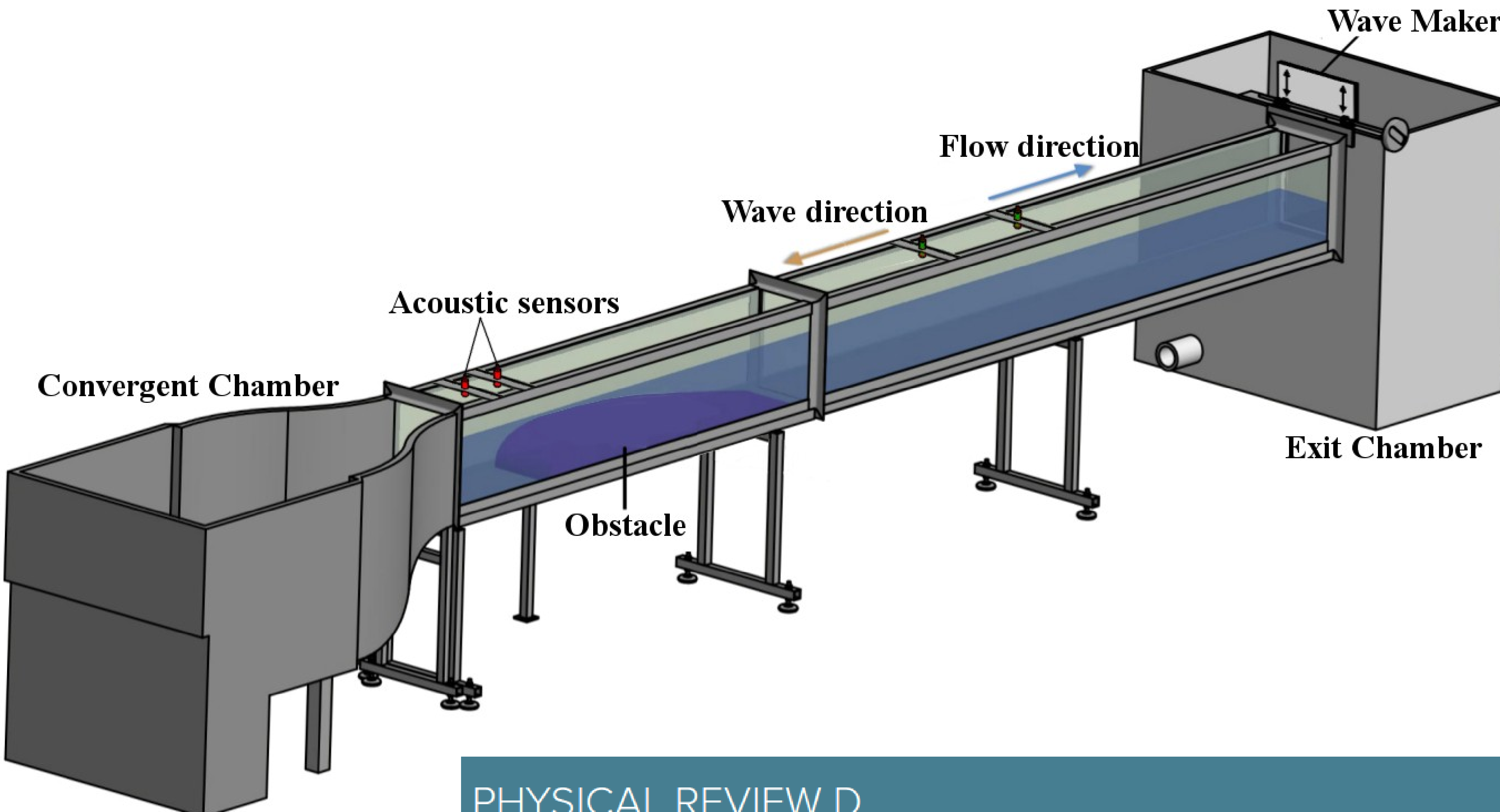
Experimento

EdLabQuip

Education - Laboratories - Equipment



Row 1 Row 2 Row 3 Row 4



Row 1

PHYSICAL REVIEW D
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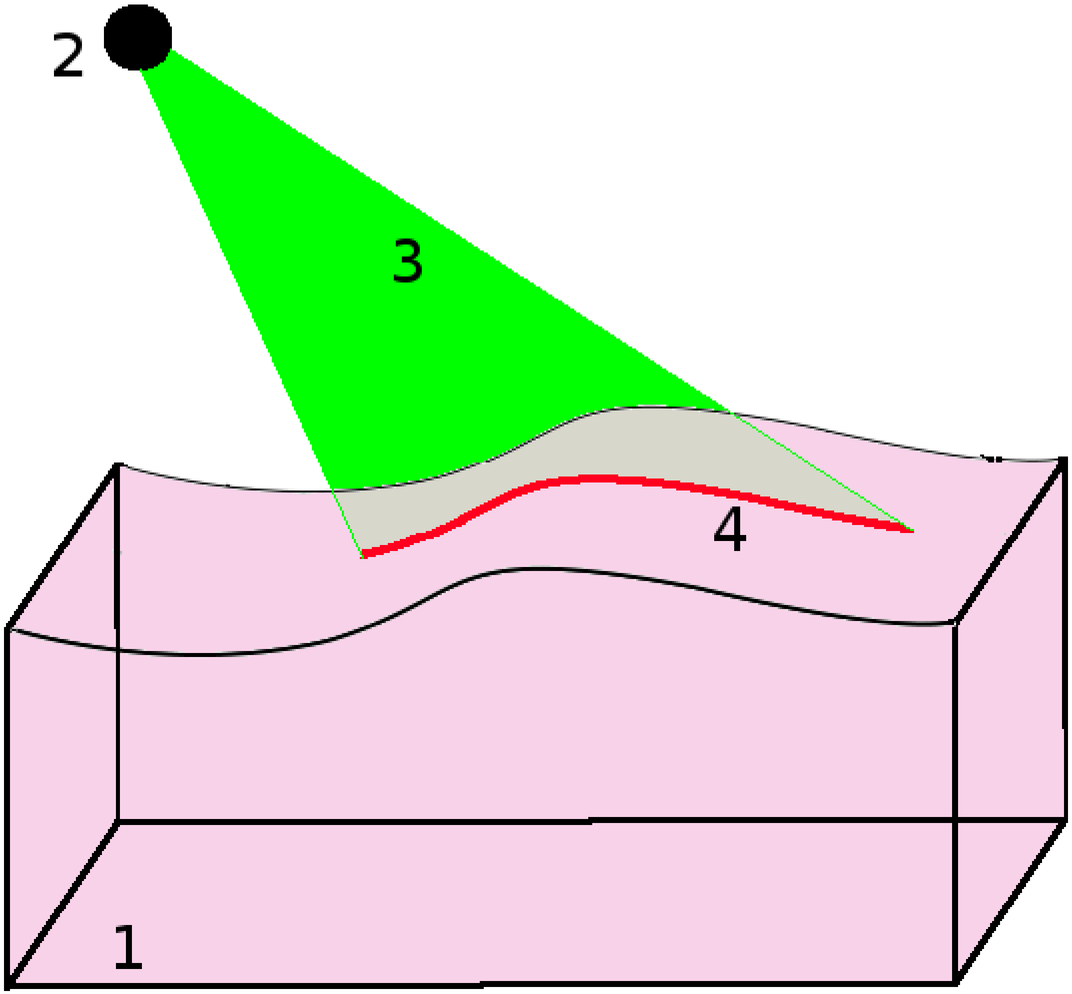
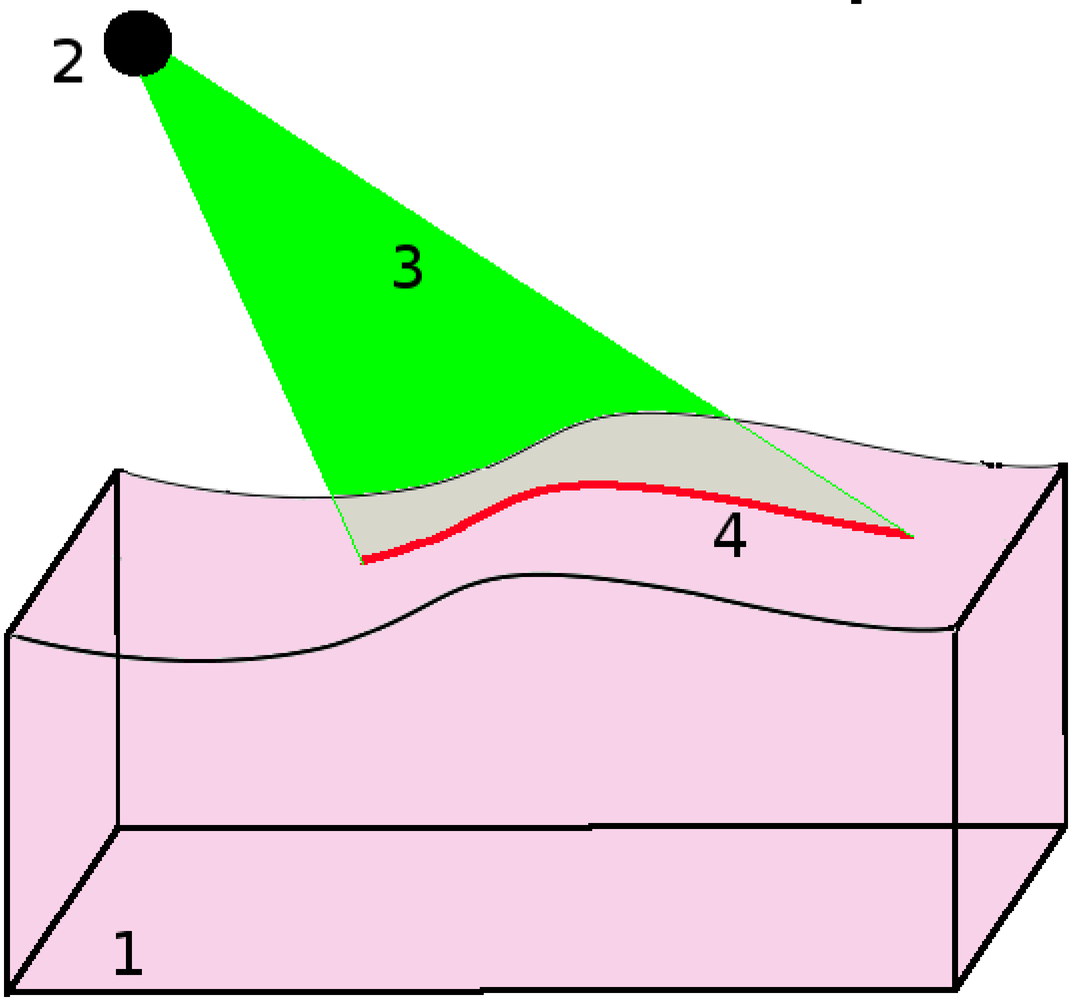
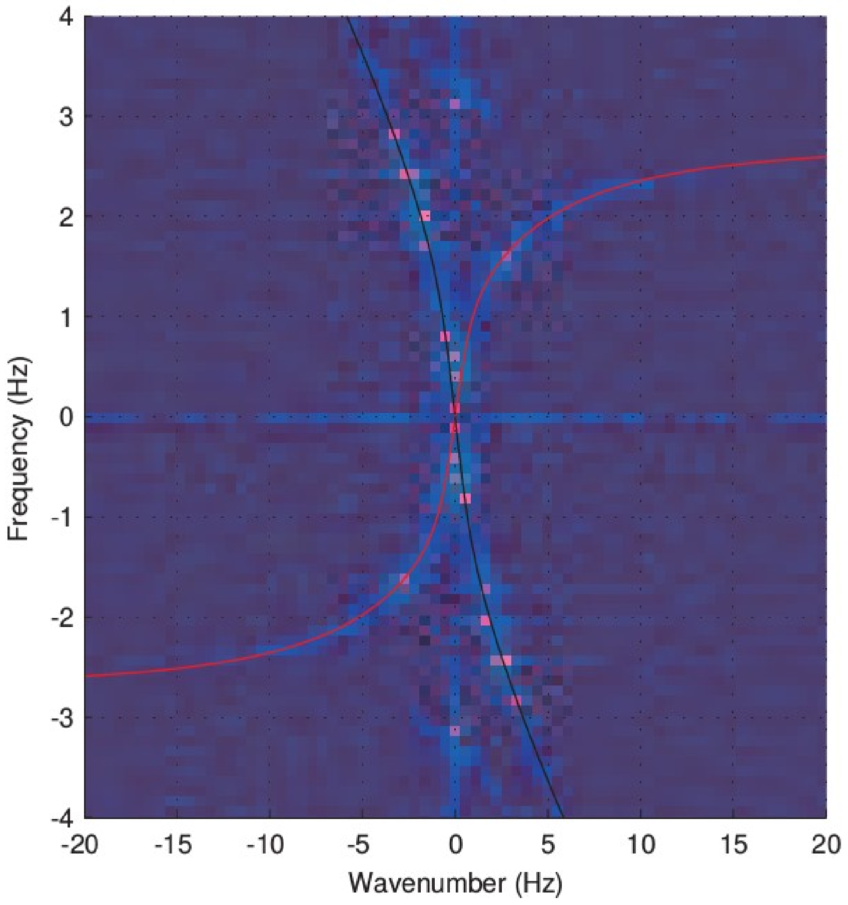
Experimento

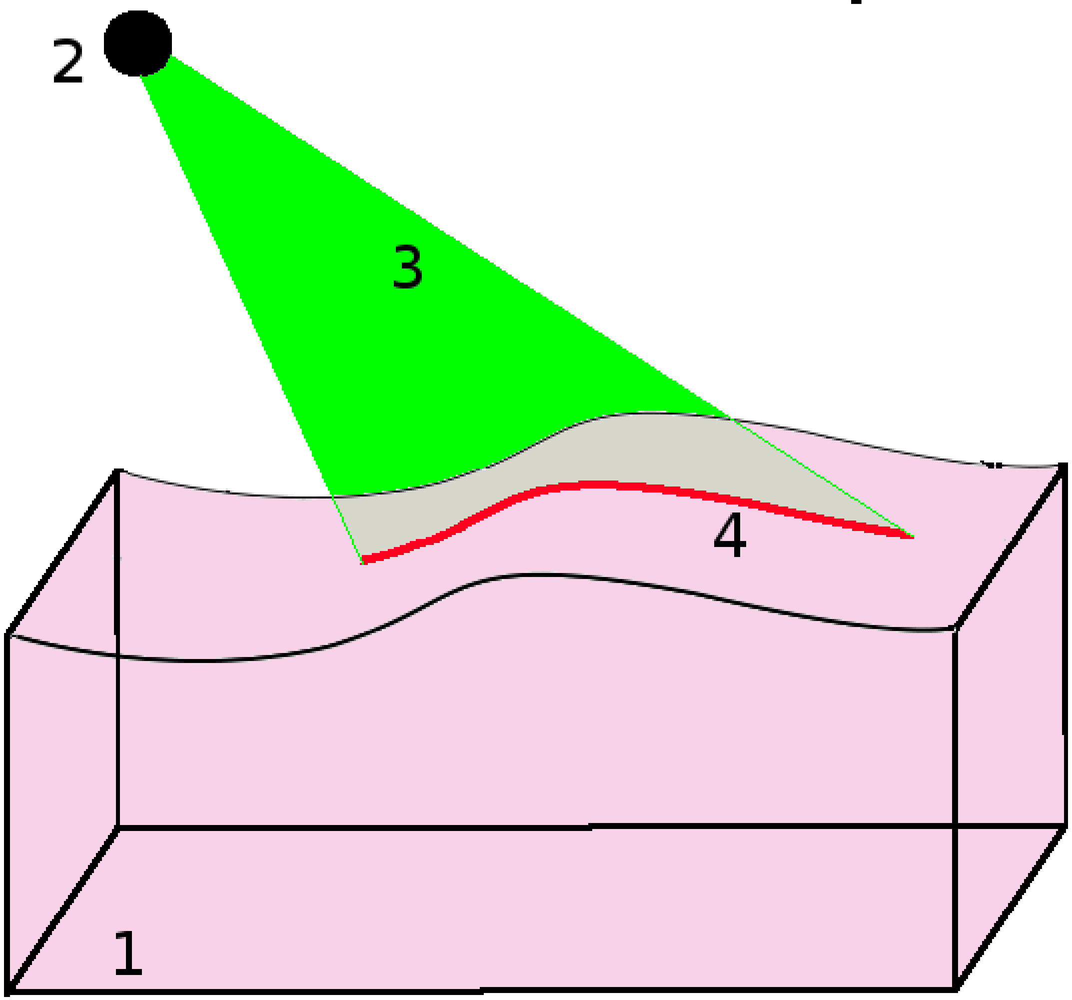


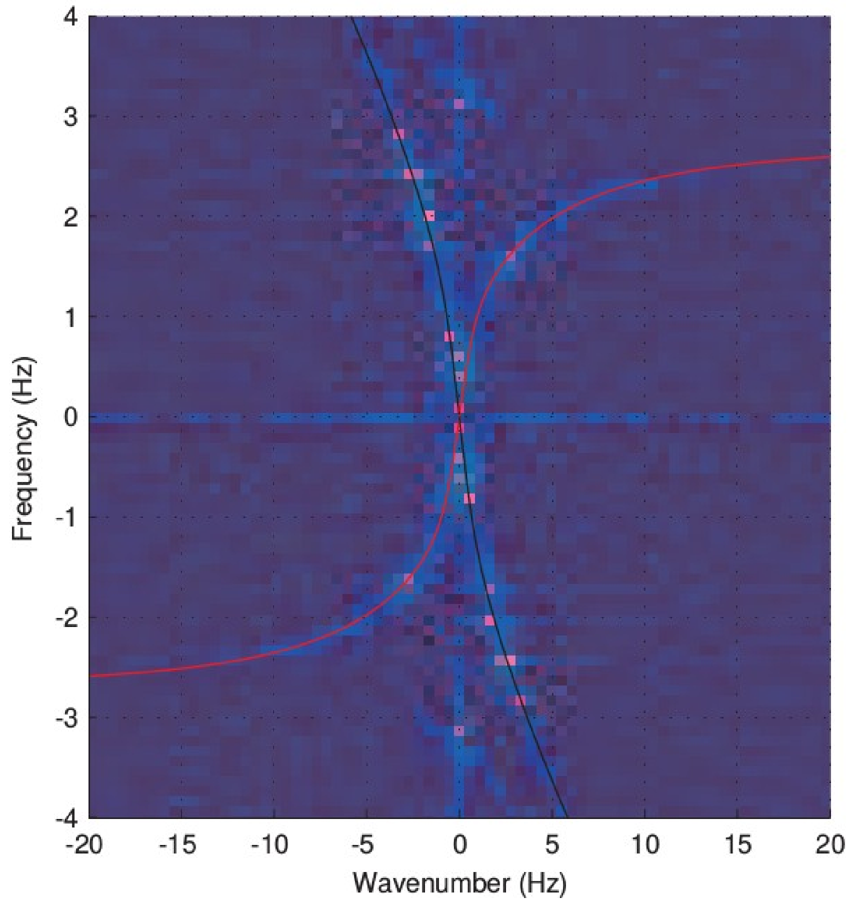
Experimento





Experimento





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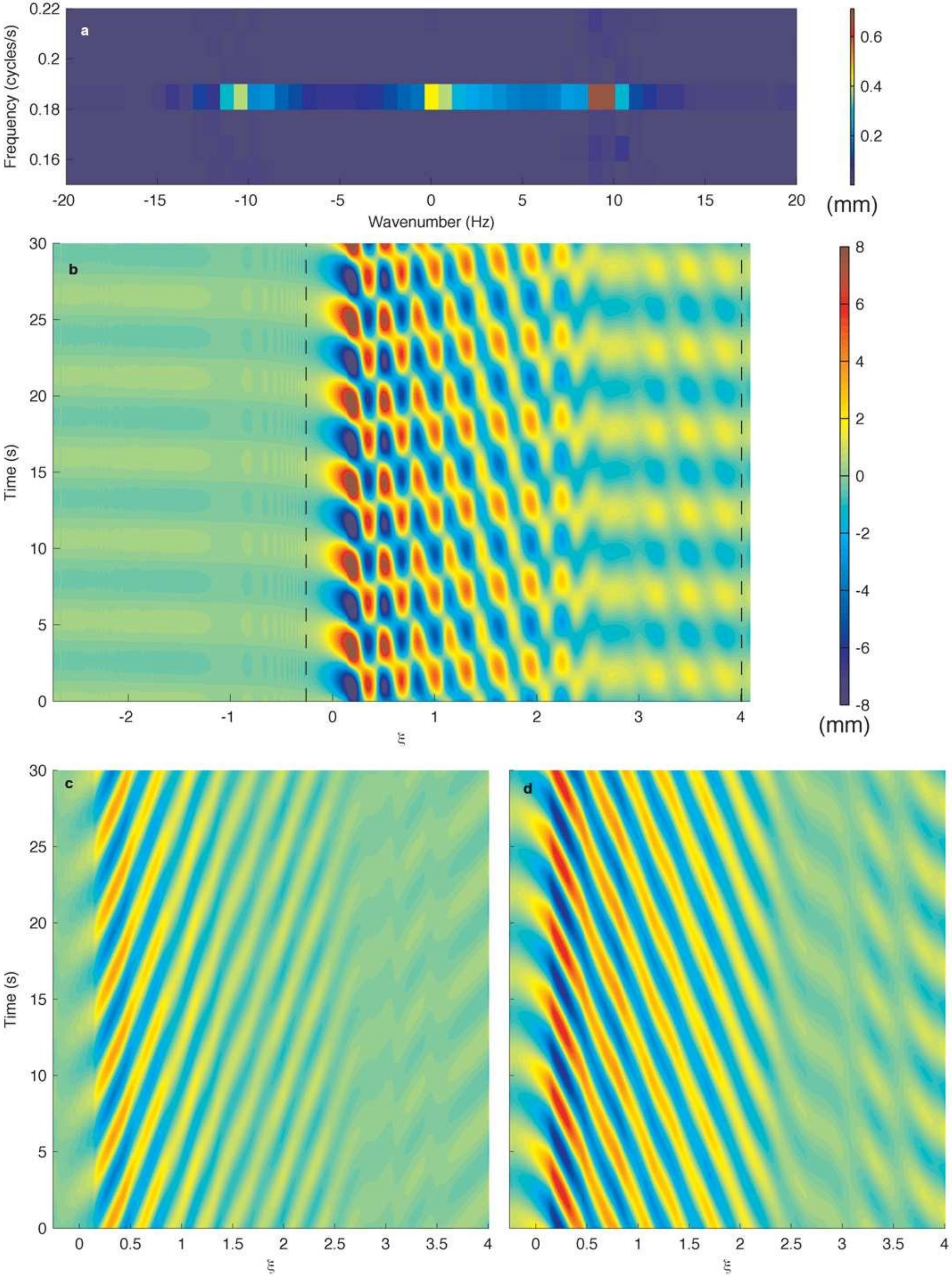
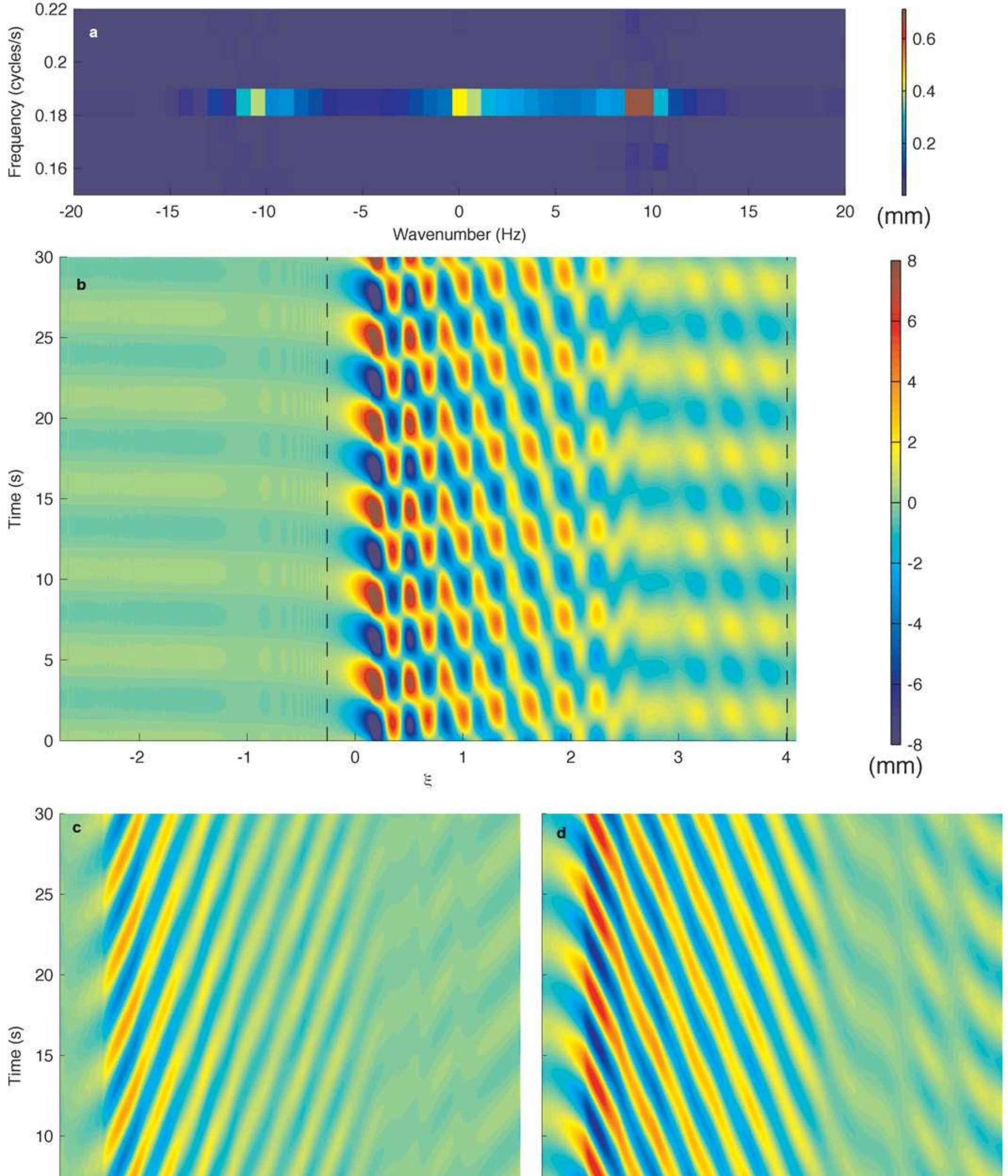
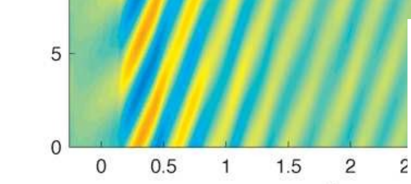

a
Frequency (cycles/s)
Wavenumber (Hz)
(mm)
b
Time (s)
ξ
(mm)
c
Time (s)
ξ
d
ξ





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