El Poder de la Ciencia

The Power of Science

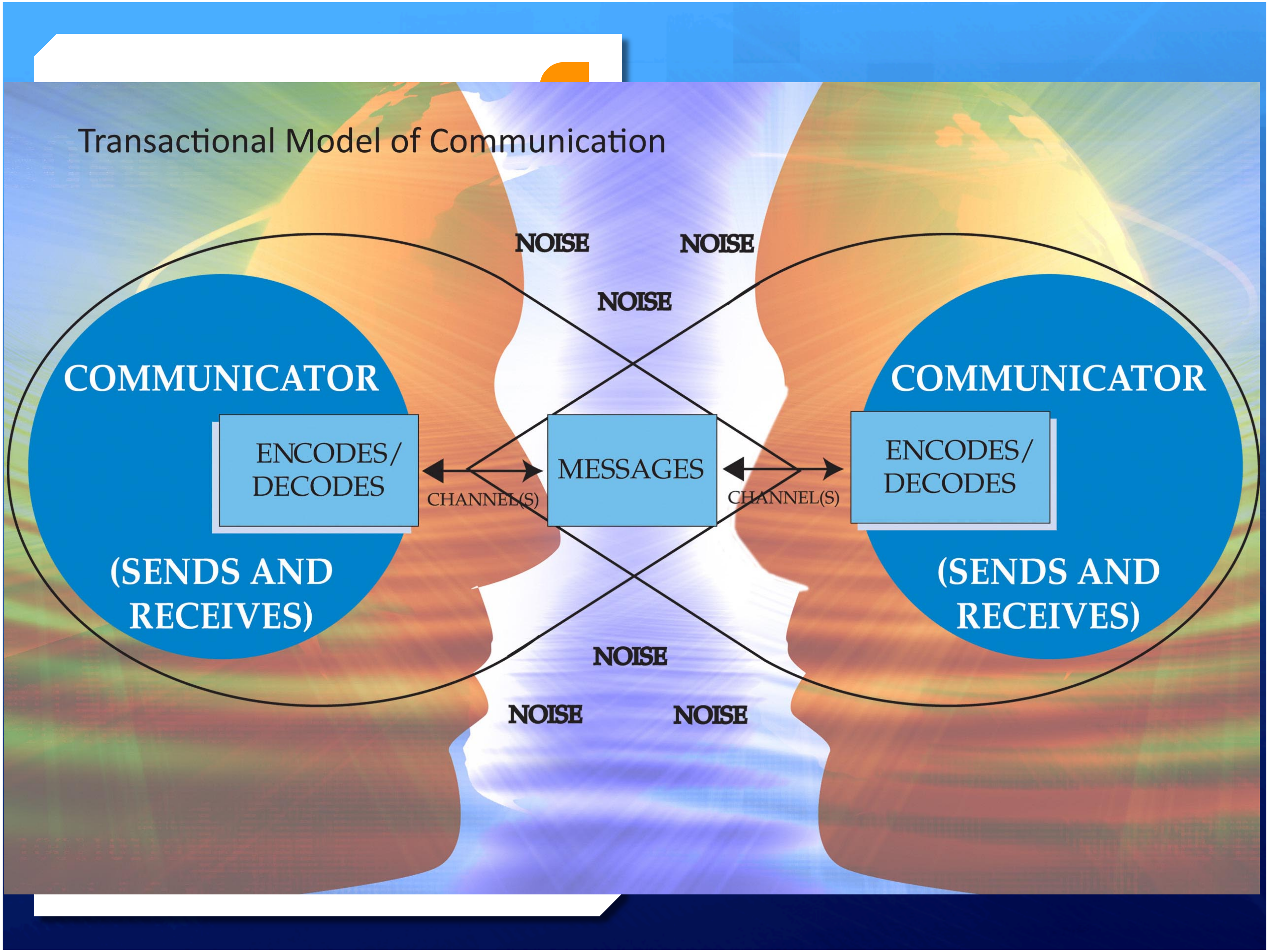
Modulo II: La creatividad de las hipótesis: Arte y Ciencia

- Percepciones sociales de la ciencia. Construcción cultural de la Ciencia
- Corrientes artísticas: Técnica y razón desde una visión científica. De la Ciencia al arte.
- Nuevas vanguardias asociadas a fenomenales revoluciones en el Siglo XX. Del Arte a la Ciencia
- Construcción del espacio urbano en torno a problemáticas ciéntificas.
- Intervención del Espacio Urbano con Ciencia y Arte

Clase X

Comunicación interna entre científicos


Transmisor
Señal
Receptor
Fuente
Destino


Transactional Model of Communication
NOISE
NOISE
NOISE
COMMUNICATOR
ENCODES/ DECODES
(SENDS AND RECEIVES)
CHANNEL(S)
MESSAGES
CHANNEL(S)
COMMUNICATOR
ENCODES/ DECODES
(SENDS AND RECEIVES)
NOISE
NOISE
NOISE

Content-Context

Contenido: son las palabras, símbolos del mensaje comunicado. Esto es conocido como lenguaje

Contexto: es la forma en que el mensaje es entregado. Es llamado paralenguaje.

```
def add5(x):
    return x+5

def dotwrite(ast):
    nodename = getNodename()
    label=symbol.sym_name.get(int(ast[0]),ast[0])
    print '    %s [label="%s' % (nodename, label),
    if isinstance(ast[1], str):
        if ast[1].strip():
            print '= %s"];' % ast[1]
        else:
            print '"]'
    else:
        print '"];'
        children = []
        for n, child in enumerate(ast[1:]):
            children.append(dotwrite(child))
        print '    %s -> {' % nodename,
        for name in children:
            print '%s' % name,
```

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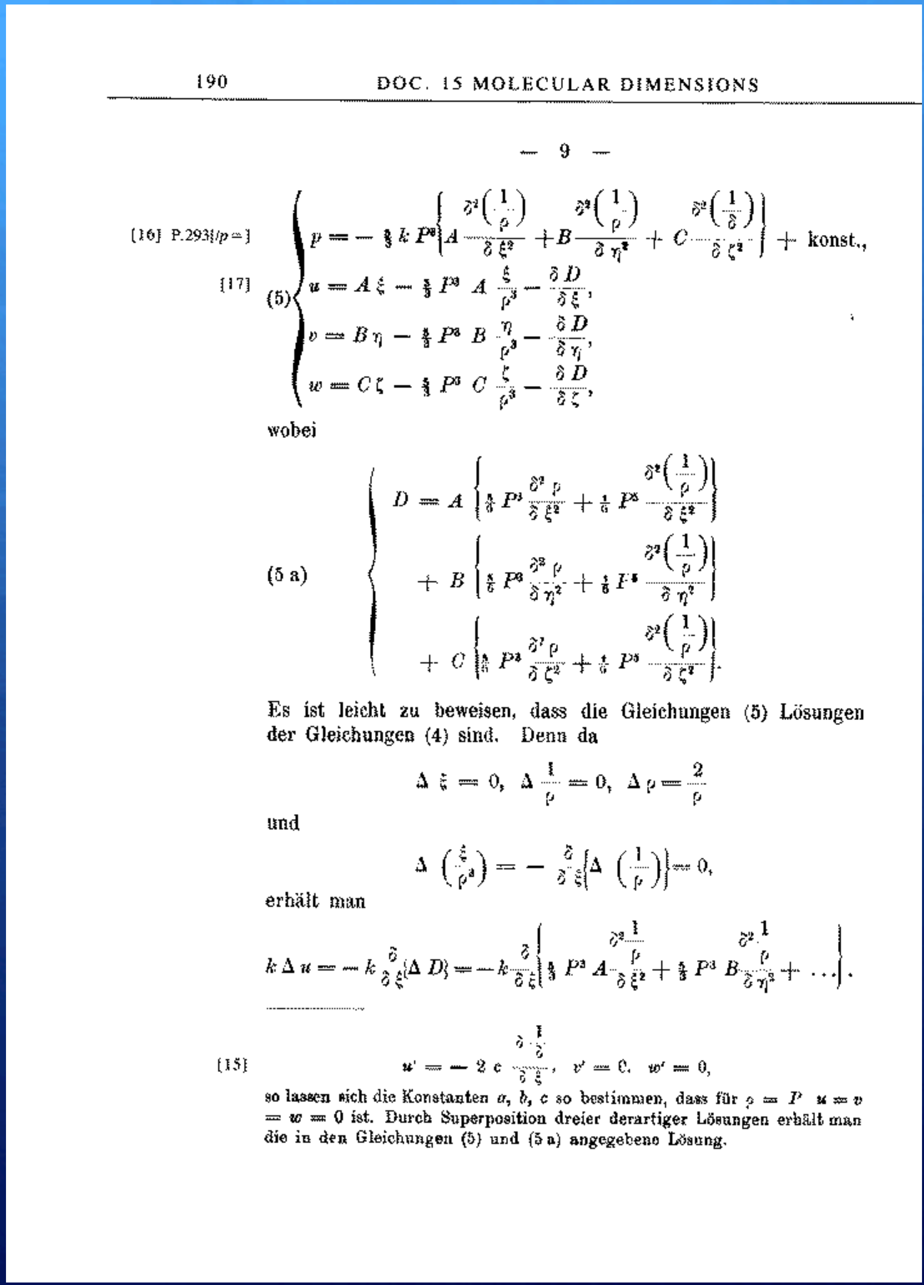

[16] P.293[/p=]
[17]

$$
(5)\begin{cases}
p = -\tfrac{5}{6}\,k\,P^3\left\{A\dfrac{\partial^2\left(\frac{1}{\rho}\right)}{\partial\xi^2}+B\dfrac{\partial^2\left(\frac{1}{\rho}\right)}{\partial\eta^2}+C\dfrac{\partial^2\left(\frac{1}{\rho}\right)}{\partial\zeta^2}\right\}+\text{konst.},\\
u = A\,\xi-\tfrac{5}{6}\,P^3\,A\,\dfrac{\xi}{\rho^3}-\dfrac{\partial D}{\partial\xi},\\
v = B\,\eta-\tfrac{5}{6}\,P^3\,B\,\dfrac{\eta}{\rho^3}-\dfrac{\partial D}{\partial\eta},\\
w = C\,\zeta-\tfrac{5}{6}\,P^3\,C\,\dfrac{\zeta}{\rho^3}-\dfrac{\partial D}{\partial\zeta},
\end{cases}
$$

wobei

$$
(5\,a)\begin{cases}
D = A\left\{\tfrac{5}{6}\,P^3\dfrac{\partial^2\rho}{\partial\xi^2}+\tfrac{1}{6}\,P^5\dfrac{\partial^2\left(\frac{1}{\rho}\right)}{\partial\xi^2}\right\}\\
\quad + B\left\{\tfrac{5}{6}\,P^3\dfrac{\partial^2\rho}{\partial\eta^2}+\tfrac{1}{6}\,P^5\dfrac{\partial^2\left(\frac{1}{\rho}\right)}{\partial\eta^2}\right\}\\
\quad + C\left\{\tfrac{5}{6}\,P^3\dfrac{\partial^2\rho}{\partial\zeta^2}+\tfrac{1}{6}\,P^5\dfrac{\partial^2\left(\frac{1}{\rho}\right)}{\partial\zeta^2}\right\}.
\end{cases}
$$

Es ist leicht zu beweisen, dass die Gleichungen (5) Lösungen der Gleichungen (4) sind. Denn da

$$\Delta\,\xi = 0,\quad \Delta\,\frac{1}{\rho} = 0,\quad \Delta\,\rho = \frac{2}{\rho}$$

und

$$\Delta\left(\frac{\xi}{\rho^3}\right) = -\frac{\partial}{\partial\xi}\left\{\Delta\left(\frac{1}{\rho}\right)\right\} = 0,$$

erhält man

$$k\,\Delta\,u = -k\,\frac{\partial}{\partial\xi}\{\Delta\,D\} = -k\,\frac{\partial}{\partial\xi}\left\{\tfrac{5}{3}\,P^3\,A\,\frac{\partial^2\frac{1}{\rho}}{\partial\xi^2}+\tfrac{5}{3}\,P^3\,B\,\frac{\partial^2\frac{1}{\rho}}{\partial\eta^2}+\dots\right\}.$$

---

[15]

$$u' = -2\,c\,\frac{\partial\,\frac{1}{\rho}}{\partial\xi},\quad v' = 0,\quad w' = 0,$$

so lassen sich die Konstanten a, b, c so bestimmen, dass für $\rho = P$ $u = v = w = 0$ ist. Durch Superposition dreier derartiger Lösungen erhält man die in den Gleichungen (5) und (5 a) angegebene Lösung.

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PRL **100,** 064503 (2008) PHYSICAL REVIEW LETTERS week ending 15 FEBRUARY 2008

Fluctuations of Energy Flux in Wave Turbulence

Éric Falcon,[1] Sébastien Aumaître,[2] Claudio Falcón,[3] Claude Laroche,[1,3] and Stéphan Fauve[3]

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We report that the power driving gravity and capillary wave turbulence in a statistically stationary regime displays fluctuations much stronger than its mean value. We show that its probability density function (PDF) has a most probable value close to zero and involves two asymmetric roughly exponential tails. We understand the qualitative features of the PDF using a simple Langevin-type model.

DOI: 10.1103/PhysRevLett.100.064503 PACS numbers: 47.35.−i, 68.03.Cd, 92.10.Hm

When a dissipative system is driven in a statistically stationary regime by an external forcing, a given amount of power per unit mass, ϵ, is transferred from the driving device to the system and is ultimately dissipated. In fully developed turbulence, a flow is driven at large scales, and nonlinear interactions transfer kinetic energy toward small scales where viscous dissipation takes place. In the intermediate range of scales (the inertial range), the key role of the energy flux ϵ has been first understood by Kolmogorov [1]. Using dimensional arguments, he derived the law $E(k) \propto \epsilon^{2/3}k^{-5/3}$ for the energy density $E(k)$ as a function of the wave number k. Kolmogorov type spectra have been derived analytically in wave turbulence, i.e., in various systems involving an ensemble of weakly interacting nonlinear waves (see for instance [2] for a review). In all cases, it has been assumed that ϵ is a given constant parameter. However, it should be kept in mind that ϵ is not an input parameter in most experiments or simulations of dissipative systems. Its value is not externally controlled but determined by the impedance of the system. In addition, as we have already shown for a variety of different dissipative systems [3–5], the energy flux or related global quantities strongly fluctuate in time although being averaged in space on the whole system or on its boundaries. These fluctuations should not be confused with small scale intermittency which occurs in fully developed turbulence. The later is related to the spotness of dissipation in space [6], and its description does not involve a time dependent ϵ.

Here, we study the fluctuations of the injected power in wave turbulence. Gravity-capillary waves are generated on a fluid layer by low frequency random vibrations of a wave maker. By measuring the applied force on the wave maker and its velocity, we determine the instantaneous power $I(t)$ injected into the fluid. We observe that it strongly fluctuates. Its most probable value is 0. rms fluctuations σ_I up to several times the mean value $\langle I \rangle$ are observed, and the probability density function (PDF) of I displays roughly exponential tails for both positive and negative values of I. These negative values correspond to events for which the random wave field gives back energy to the driving device. We show how fluctuations of the injected power depend on the system size and on the mean dissipation, and we study their statistical properties.

The experimental setup, described in [7], consists of a rectangular plastic vessel, with lateral dimensions 57×50 or 20×20 cm^2, filled with water or mercury (density 13.6 times larger than water) up to a height, $h = 1.8$ or 2.3 cm. Surface waves are generated by the horizontal motion of a rectangular ($L \times H$ cm^2) plunging plastic wave maker driven by an electromagnetic vibration exciter. We take $1.2 < L < 25$ cm and $H = 3.5$ cm. The wave maker is driven with random noise excitation below 4 or 6 Hz.

The power injected into the wave field by the wave maker is determined as follows. The velocity $V(t)$ of the wave maker is measured using a coil placed on the top of the vibration exciter. The voltage induced by the moving permanent magnet of the vibration exciter is proportional to $V(t)$. The force $F_A(t)$ applied by the vibration exciter on the wave maker is measured by a piezoresistive force transducer (FGP 10 daN). The time recordings of $V(t)$ and $F_A(t)$ together with their PDFs are displayed in Fig. 1. Both $V(t)$ and $F_A(t)$ are Gaussian with zero mean

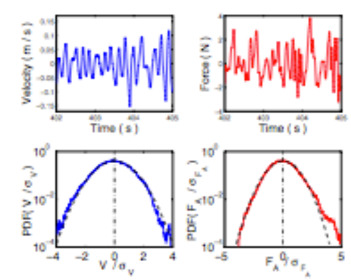

FIG. 1 (color online). Time recordings of the velocity of the wave maker and the force applied to the wave maker by the vibration exciter. The fluid is mercury, with $h = 23$ mm. Both PDFs are Gaussian (dashed lines) with zero mean value.

Content-Context

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Comunicación científica interna: Como se comunican los científicos

- Emisor-Receptor.
- Fuente.
- Mensaje.
- Canal.
- Ruido.
- Retroalimentación
- Contexto.