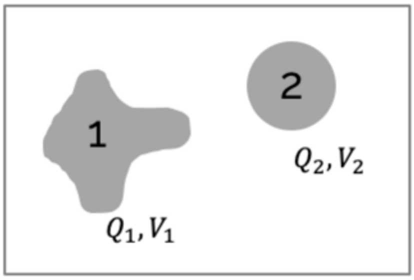
Departamento de Física
.UBAexactas

Física 3
V-2022
Parte 15

Carga y potencial de un sistema de conductores

$$q = C\,V$$



$$Q_1 = C_{11}V_1 + C_{12}V_2$$

$$Q_2 = C_{21}V_1 + C_{22}V_2$$

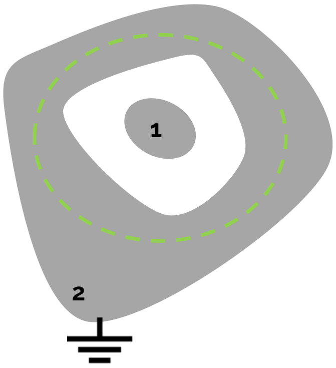
$$C_{mn}$$

$m = n$	Coeficientes de **capacidad** de los conductores en el sistema	> 0
$m \neq n$	Coeficientes de **inducción** de los conductores en el sistema	< 0
	$C_{mn} = C_{nm}$	

Carga y **potencial** de un sistema de **dos** conductores

$$Q_1 = C_{11}V_1 + C_{12}V_2$$

$$Q_2 = C_{21}V_1 + C_{22}V_2$$



$$\left.\begin{aligned} Q_1 &= C_{11}V_1 \\ Q_2 &= C_{21}V_1 = -Q_1 \end{aligned}\right\}$$

Capacidad de un **capacitor**
(sistema de dos conductores
donde uno rodea al otro)

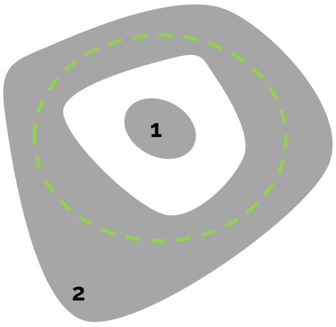
$$C = \boxed{C_{11} = -C_{21}}$$

Carga y **potencial** de un sistema de **dos** conductores

$$\boxed{C = C_{11} = -C_{21}}$$

$$Q_1 = C\,V_1 - C\,V_2$$

$$Q_2 = -C\,V_1 + C_{22}V_2$$



$$Q_1 = C\,(V_1 - V_2)$$

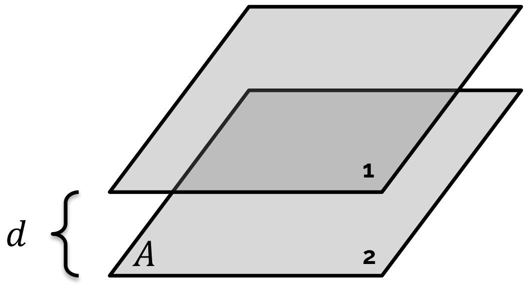
$$Q_2 = -C\,V_1 + C_{22}V_2$$

$$Q_2 = -Q_1 + C'\,V_2$$

$$C' = C_{22} - C'$$

Capacitor plano

$$Q_1 = C\,(V_1 - V_2)$$



$$C = \frac{Q_1}{V_1 - V_2} = \frac{\varepsilon_0\, A}{d}$$

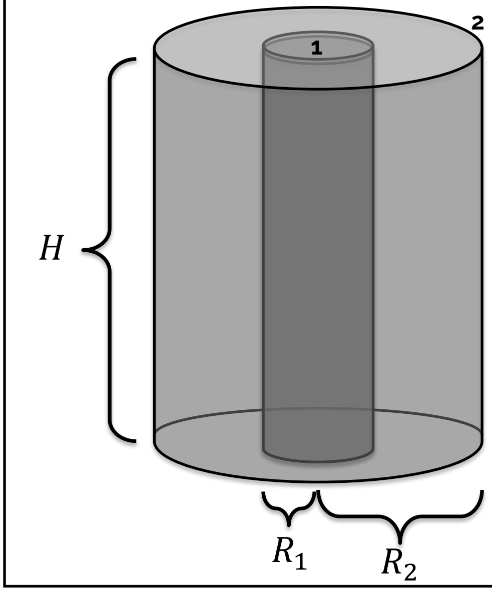
PhET INTERACTIVE SIMULATIONS

jupyter

CO

Capacitor cilíndrico

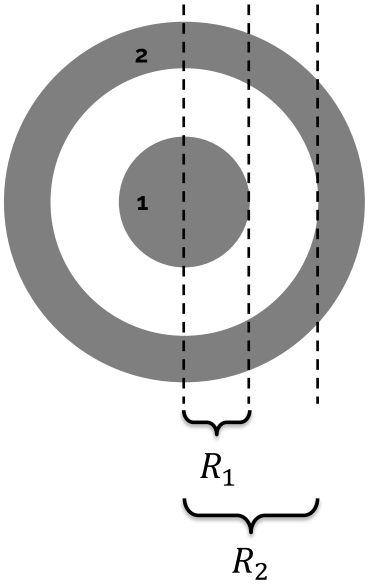
$$Q_1 = C\ (V_1 - V_2)$$



$$C = \frac{Q_1}{V_1 - V_2} = \frac{2\pi\ \varepsilon_0\ H}{\log {}^{R_2}\!/_{R_1}}$$

Capacitor esférico

$$Q_1 = C\ (V_1 - V_2)$$



$$C = \frac{Q_1}{V_1 - V_2} = \frac{4\pi\ \varepsilon_0}{\left({}^{1}\!/_{R_1} - {}^{1}\!/_{R_2}\right)}$$

PhET INTERACTIVE SIMULATIONS

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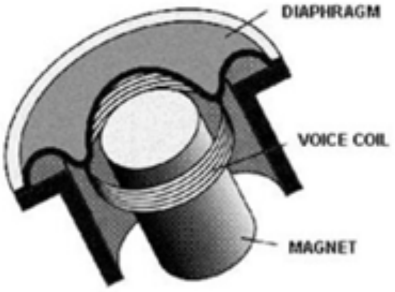
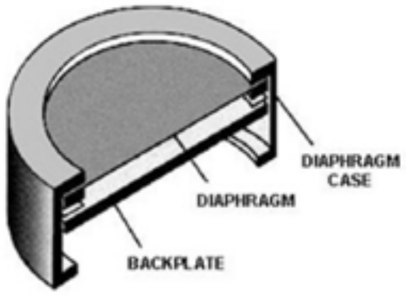
CO

Micrófonos: ondas de presión a voltaje/corriente



Dynamic

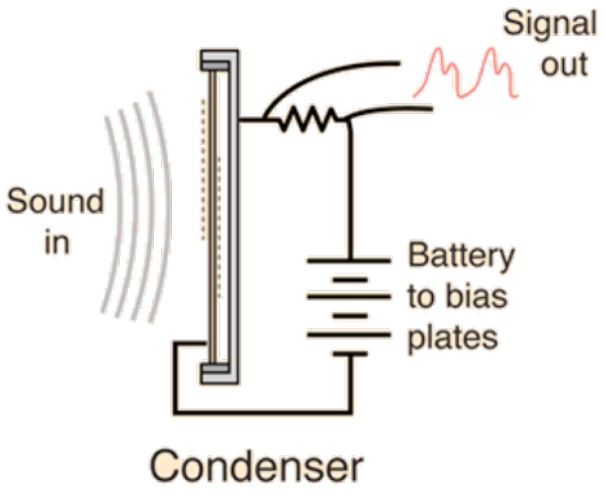
Unidad 5/6

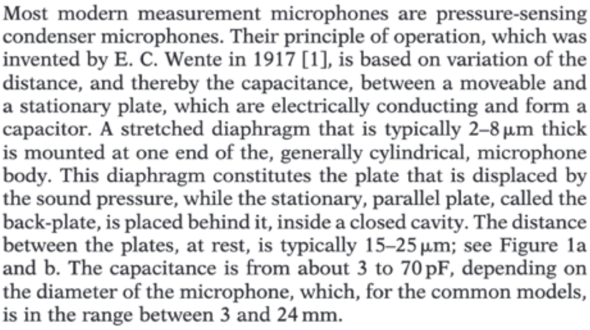


Condenser

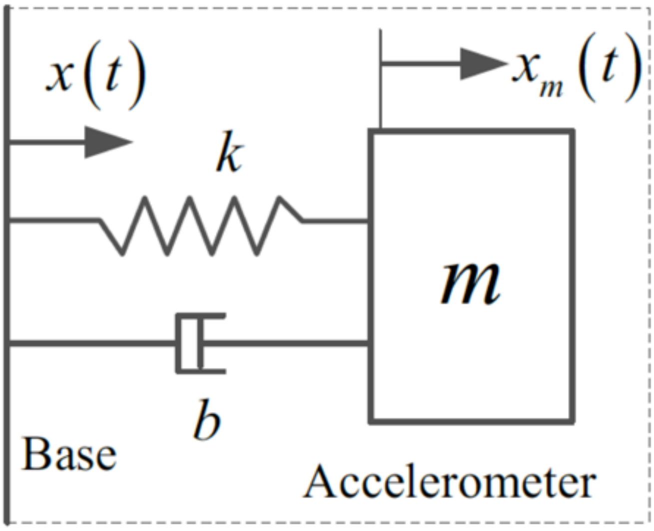
Unidad 2/3

El micrófono condensador



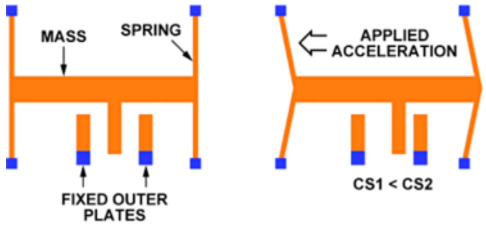

Most modern measurement microphones are pressure-sensing condenser microphones. Their principle of operation, which was invented by E. C. Wente in 1917 [1], is based on variation of the distance, and thereby the capacitance, between a moveable and a stationary plate, which are electrically conducting and form a capacitor. A stretched diaphragm that is typically 2–8 µm thick is mounted at one end of the, generally cylindrical, microphone body. This diaphragm constitutes the plate that is displaced by the sound pressure, while the stationary, parallel plate, called the back-plate, is placed behind it, inside a closed cavity. The distance between the plates, at rest, is typically 15–25 µm; see Figure 1a and b. The capacitance is from about 3 to 70 pF, depending on the diameter of the microphone, which, for the common models, is in the range between 3 and 24 mm.

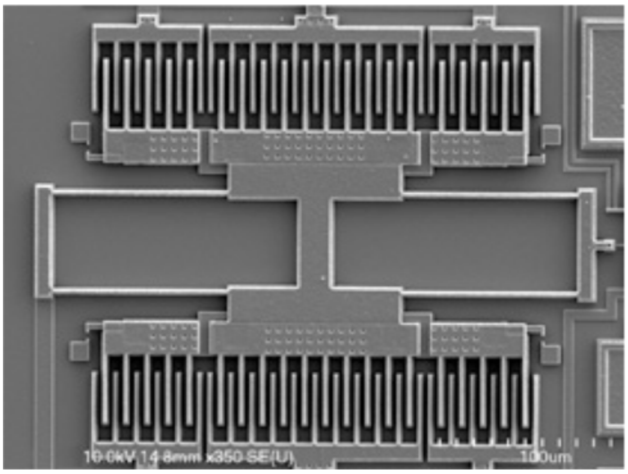
Acelerómetro



Acelerómetro **capacitivo**

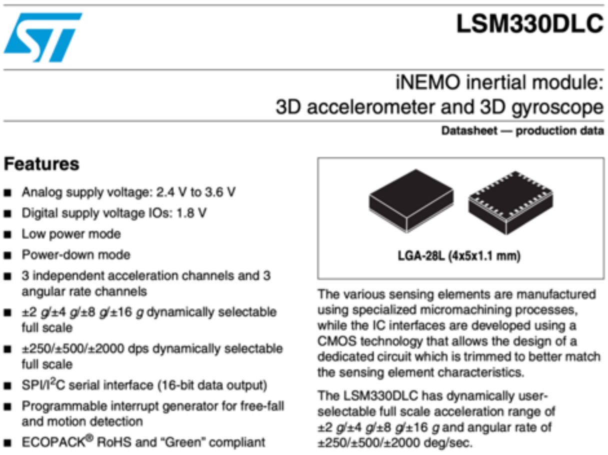
MEMS: Micro-electromechanical systems





Acelerómetro **capacitivo**

Samsung Galaxy Note 3



LSM330DLC

iNEMO inertial module:
3D accelerometer and 3D gyroscope

Datasheet — production data

Features

- Analog supply voltage: 2.4 V to 3.6 V
- Digital supply voltage IOs: 1.8 V
- Low power mode
- Power-down mode
- 3 independent acceleration channels and 3 angular rate channels
- ±2 *g*/±4 *g*/±8 *g*/±16 *g* dynamically selectable full scale
- ±250/±500/±2000 dps dynamically selectable full scale
- SPI/I^2C serial interface (16-bit data output)
- Programmable interrupt generator for free-fall and motion detection
- ECOPACK® RoHS and “Green” compliant

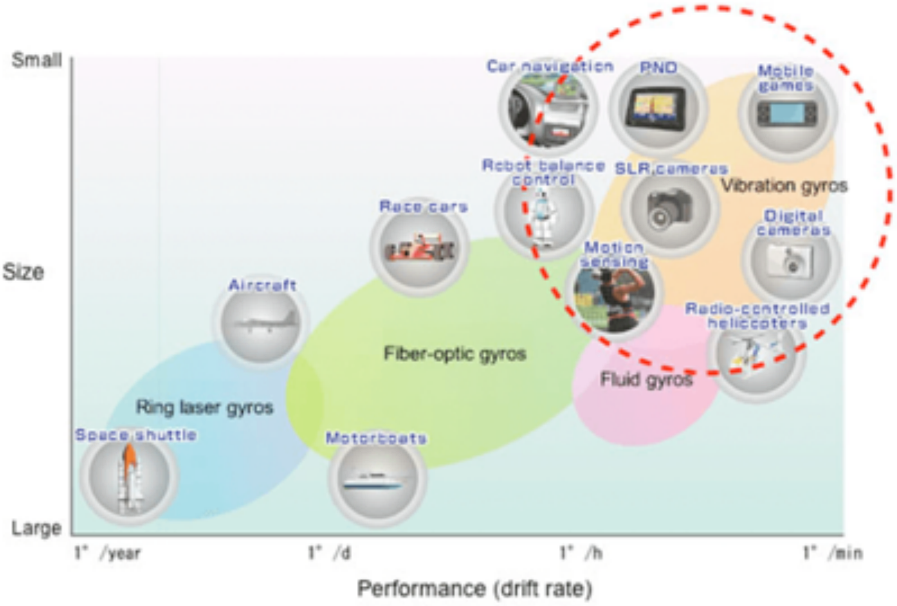
LGA-28L (4x5x1.1 mm)

The various sensing elements are manufactured using specialized micromachining processes, while the IC interfaces are developed using a CMOS technology that allows the design of a dedicated circuit which is trimmed to better match the sensing element characteristics.

The LSM330DLC has dynamically user-selectable full scale acceleration range of ±2 *g*/±4 *g*/±8 *g*/±16 *g* and angular rate of ±250/±500/±2000 deg/sec.

At steady state the nominal value of the capacitors are few pF and when an acceleration is applied the maximum variation of the capacitive load is in fF range.

Giróscopo



Giróscopo resonante: Coriolis

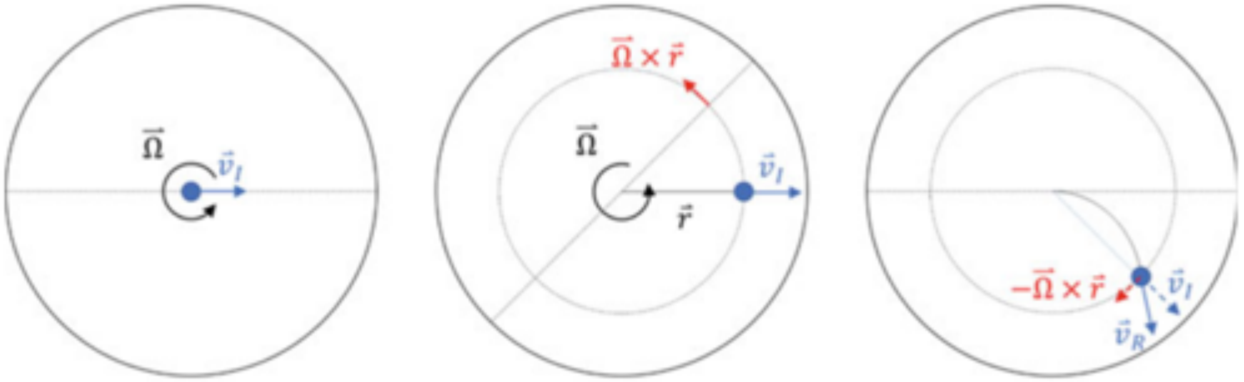
$$\vec{v}_I = \vec{v}_R + \vec{\Omega} \times \vec{r}$$

$$\vec{a}_I = \left(\frac{d^2\vec{r}}{dt^2}\right)_I = \left[\left(\frac{d}{dt}\right)_R + \vec{\Omega} \times\right]^2 \vec{r}$$

$$= \left(\frac{d^2\vec{r}}{dt^2}\right)_R + 2\vec{\Omega} \times \left(\frac{d\vec{r}}{dt}\right)_R + \vec{\Omega} \times (\vec{\Omega} \times \vec{r})$$

$$= \vec{a}_R + 2\vec{\Omega} \times \vec{v}_R - \Omega^2 \vec{r}$$

Giróscopo resonante: Coriolis

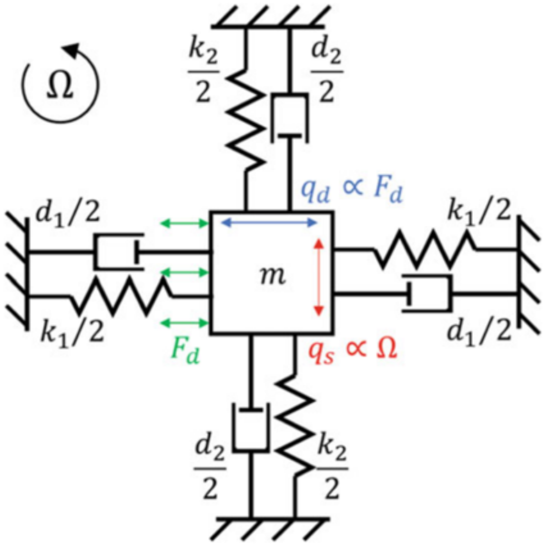


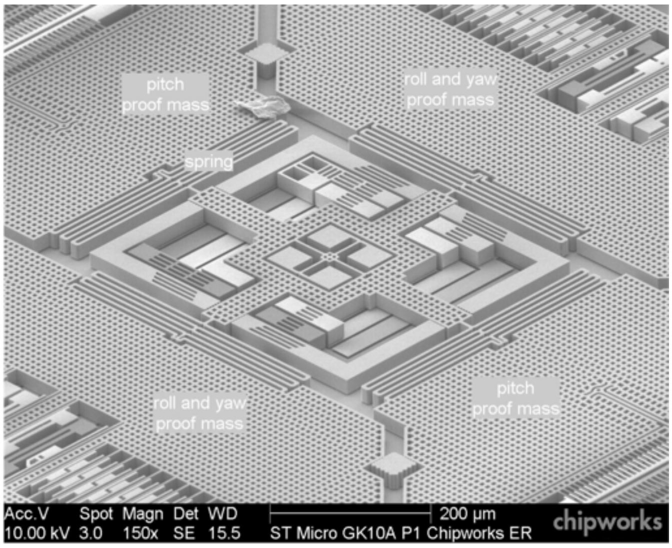
t= 0

Sistema Inercial (t>0)

Sistema Rotante (t>0)

Giróscopo resonante: Coriolis





$$Q_1 = {\color{red}C}\,(V_1 - V_2)$$