

Link 30/04/2020

- Link alle due lezioni registrate:
 - <https://drive.google.com/open?id=13tIZ3a40MAcepvfyYDAAWpkQuwh81Ylu>

Taylor

taylor an introduction to error analysis pdf - Google Search

https://www.google.com/search?client=firefox-b-d&q=taylor+an+i...

The image shows a Google search interface. At the top left is the Google logo. The search bar contains the text "taylor an introduction to error analysis pdf". To the right of the search bar are icons for "x" and "q". Below the search bar are navigation links: "All", "Images", "News", "Videos", "Shopping", "More", "Settings", and "Tools". The search results show "About 177,000,000 results (0.43 seconds)". The first result is from "hep.ucsb.edu > courses > Taylor" with a "PDF" icon. The title is "Taylor - UCSB HEP". The snippet reads: "AN INTRODUCTION TO. **Error Analysis**. THE STUDY OF UNCERTAINTIES. IN PHYSICAL MEASUREMENTS. SECOND EDITION. John R. **Taylor**. PROFESSOR ...". Below the result is a box titled "People also search for" containing three suggestions: "error analysis taylor solutions ph 3 caltech", "taylor series error analysis pdf drive", and "propagation of error book".

30 Aprile 2020 (1)

$$\begin{matrix} x \\ \delta x \\ + \\ y \\ \delta y \end{matrix}$$

$$\left. \begin{matrix} 10 \pm 1 \\ 30 \pm 2 \end{matrix} \right\}$$

CASUALE

$$q = x + y$$

$$q_b = 40$$

$$\delta q = 1 + 2$$

$$\delta q = 2$$

$$\delta q = \delta x \oplus \delta y = \sqrt{(\delta x)^2 + (\delta y)^2}$$

$$= \sqrt{1 + 4} = \sqrt{5} = 2.23$$

$$q = x - y$$

$$q_b = -20$$

$$q = x \cdot y$$

$$q_b = 300$$

$$\delta q$$

$$q_b = 300 \pm 40$$

$$\frac{\delta q}{q_b} = \frac{\delta x}{x_b} \oplus \frac{\delta y}{y_b}$$

$$= \sqrt{\left(\frac{\delta x}{x_b}\right)^2 + \left(\frac{\delta y}{y_b}\right)^2} =$$

$$\delta q = 0.12 \cdot q_b = 0.12 \cdot 300 = 36$$

$$= \sqrt{\left(\frac{1}{10}\right)^2 + \left(\frac{2}{30}\right)^2} = \sqrt{0.014}$$

$$0.01 \quad 0.0044 = 0.12$$

$$q = x/y$$

$$q_b = \frac{10}{30} = \frac{1}{3} = 0.33$$

(2)

$$\left| \frac{\delta q}{q_b} \right| = 0.12$$

$$\delta q = 0.12 \cdot 0.33 = 0.04$$

$$q_b = 0.33 \pm 0.04$$

SUMME o SUBTRACTION

$$\delta q = \delta x \oplus \delta y \oplus \delta z \oplus \delta w \dots$$

PRODUKT o DIVISION

$$q = \frac{x \cdot y}{z \cdot w}$$

$$\frac{\delta q}{q} = \frac{\delta x}{x} \oplus \frac{\delta y}{y} \oplus \frac{\delta z}{z} \oplus \frac{\delta w}{w}$$

FUNKTION 1 ARBITRÄRE

$$q_b = q(x_b)$$

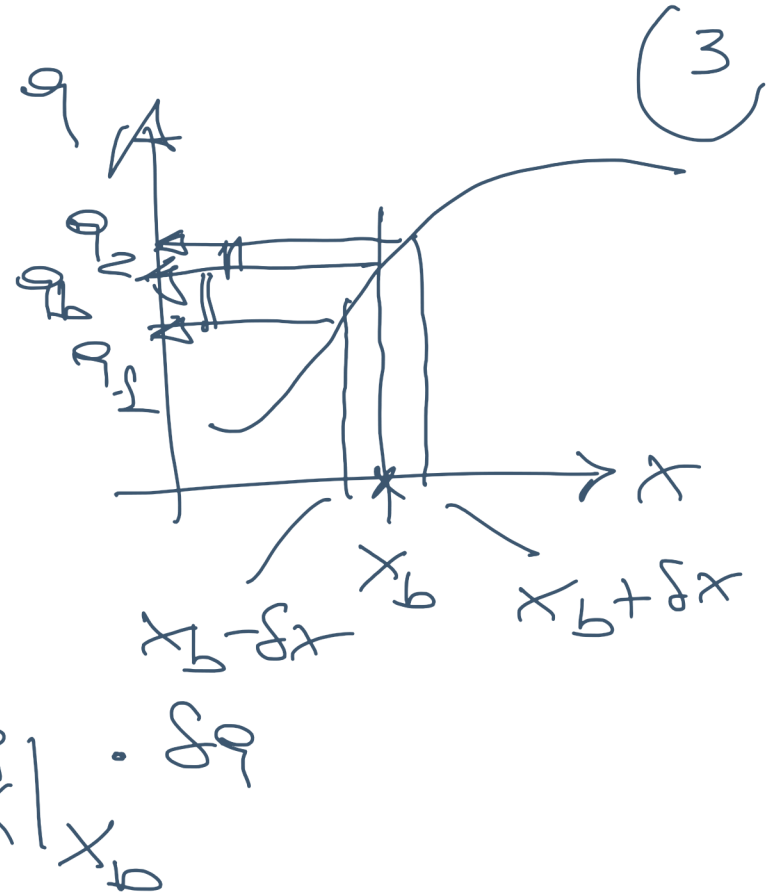
$$q(x_b + \delta x) = q_2$$

$$q(x_b - \delta x) = q_1$$

$$\delta q \approx q_2 - q_1 \approx q_b - q_1$$

$$\approx q(x_b + \delta x) - q(x_b) \approx \left. \frac{dq}{dx} \right|_{x_b} \cdot \delta x$$

$$\delta q = \left. \frac{dq}{dx} \right|_{x_b} \cdot \delta x$$



$$\delta q = \sqrt{\left(\left. \frac{dq}{dx} \right|_{x_b} \cdot \delta x \right)^2 + \left(\left. \frac{dq}{dx} \right|_{x_b} \cdot \delta x \right)^2 + \dots}$$

(4)

$$\frac{y+x}{y+z}$$

$$y = x \left(\frac{y-z}{y} \sin \alpha \right)$$

$$w = \sin \alpha$$

$$\left(\frac{dy}{dx} \right) = \frac{d}{dx} \left(\frac{y-z}{y} \right) = \frac{y-z}{y^2} \cdot \frac{dy}{dx} - \frac{1}{y^2} \cdot \frac{dy}{dx}$$

$$\frac{y+z}{y^2} \cdot \frac{dy}{dx} = \frac{y-z}{y^2} \cdot \frac{dy}{dx}$$

$$y = x \left(\frac{y-z}{y} \cdot w \right)$$

$$y = z \cdot w$$

$$\frac{dy}{dx} = \frac{dz}{dx} \quad (+)$$

$$\frac{y+z}{y^2} \cdot \frac{dy}{dx} = \frac{y-z}{y^2} \cdot \frac{dy}{dx}$$

$$y = x \left(\frac{y-z}{y} \right) \cdot x = y$$

$$y = x \cdot x = x^2$$

$$\frac{dy}{dx} = \frac{d}{dx} (x^2) = 2x$$

$$y = \frac{y-z}{y} \cdot x$$

$$\frac{q = x + y}{z + x}$$

$$\begin{cases} w = x + y \\ p = x + z \end{cases}$$

$$\begin{matrix} w, & \delta w \\ p, & \delta p \end{matrix}$$

$$q = \frac{w}{p}$$

$$\frac{\delta q}{q} = \frac{\delta w}{w} - \frac{\delta p}{p} \quad (+)$$

$$\frac{\delta w}{w} - \frac{\delta p}{p}$$

NO

$$q = x (y - z \sin \alpha)$$

α, z, y, x
INDEPENDENT

are w and p INDEPENDENT? NO

$$\delta q = \sqrt{\left(\frac{\partial q}{\partial x}\right)^2 \delta x^2 + \left(\frac{\partial q}{\partial y}\right)^2 \delta y^2 + \left(\frac{\partial q}{\partial z}\right)^2 \delta z^2}$$

CASUALI VS SISTEMATICHIE

6

CRONOMETRO

1ms

70,0 s
70,5 s
69,5 s

70,0 ± 0,5

~~70,0
70,5
71,2
71,0
70,5~~

~~70,5 ± 0,8~~
SCARICO

CASUALI

CASUALI

(S)

$$|D_i| = 1 \quad N = 5$$

$$|D_i|^2$$

(7)

f_2	-1
f_3	1
f_2	0
f_1	-1
f_3	1
	<hr/>
	0

f_2	1
f_3	1
f_2	0
f_1	1
f_3	1
	<hr/>
	4

$$\sqrt{\frac{\sum (D_i)^2}{N}}$$

DEVIAZIONE STANDARD

$$\bar{x} = f_2$$

$$= \frac{\sum_{i=1}^N x_i}{N}$$

DEVIAZIONE $x_i - \bar{x}$

$$\sum (x_i - \bar{x}) = \sum x_i - \sum \bar{x} =$$

$$= \sum x_i - \bar{x} N =$$

$$\sigma_x = \sqrt{\frac{\sum_i (x_i - \bar{x})^2}{N-1}}$$

$$\sigma_x = \sqrt{\frac{4}{4}} = \sqrt{1} = 1$$

$$= \sum x_i - \sum x_i = 0$$

N molsok

$$x_1, \dots, x_n$$

(8)

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n} = \frac{\sum x_i}{n}$$

$$\sigma_x = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

$$x \pm \sigma_x$$

- 71
- 73
- 72
- 73
- 72

- 71 ± 1
- 73 ± 1
- 72 ± 1
- 73 ± 1
- 72 ± 1

$$\sigma_x \approx x$$

$$\sqrt{\frac{\sigma_x^2}{n}} = \sqrt{\frac{1}{5}}$$

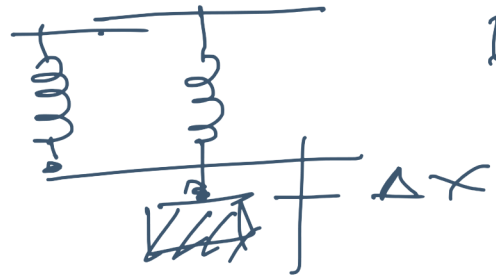
$$= \sqrt{0.2}$$

$$= 0.44$$

$$\sigma_b = 72.1 \pm 0.4 \text{ s}$$

MOLLE

$$F = kx$$



Hook's

$$k = 86, 85, 84, 89, 86 \text{ N m}^{-1}$$

$$\bar{k} = 85,9 \text{ N/m} \quad \sigma_k = 1,9 \text{ N m}^{-1} \approx 2 \text{ N m}^{-1}$$

$$F = mg$$

\bar{k}

$$86 \pm 2$$

σ

$$1,9$$

MOLLA 1

$$k = 86 \pm \frac{0,6}{\sqrt{5}} \approx 86 \pm 0,27$$

$$85,9 \pm 0,6$$

MOLLA 2

$$k_2 = 72 \text{ N m}^{-1}$$

$$k_2 = (72 \pm 2) \text{ N m}^{-1}$$

es. 4.7

1^a miscela della Molta 1

$$x_b = 72 \pm 2$$

(6)

$$\sigma_x = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

$$\sigma_x^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

$$\sigma_{x'} = \frac{\sigma_x}{\sqrt{2}}$$

$$= \sqrt{\frac{\sum (x_i - \bar{x})^2}{n(n-1)}} = \frac{\sigma_x}{\sqrt{2}}$$

INVARIANTE

2 >>

$$\sigma_x^2$$

MIGLIORA $\frac{1}{\sqrt{2}}$

$$\sum (x_i - \bar{x})^2 = \sum \sigma^2 = n \sigma^2$$

$$\sigma_x = \sqrt{\frac{n \sigma^2}{n-1}} \approx \sigma$$

$$\sigma_{x'} = \frac{\sigma}{\sqrt{2}}$$