

## Practical work 0: Errors and statistics. Measurement of friction coefficients

### Targets

This practice aims to visualize the existence of statistical errors, as well as to see how they are treated.

### Content

To do this, a simple measurement is proposed, the measurement of the coefficient of static friction between two surfaces. This can be done by leaving one body on a flat surface of another body, initially horizontally, and gradually increasing the angle until the body above the surface begins to move. In the boundary condition, the coefficient of friction between the two surfaces is equal to the tangent of the angle that the flat surface forms with the horizontal. This angle can be determined with an angle conveyor, or by measuring distance on the surface and vertical projection of the same.

It is also proposed to check whether the surfaces (body surfaces) used depend on the coefficient of friction with the force per unit area. This can be done if you have a parallelepiped body, which can rest on different sides, and can slide on two different faces before losing stability (tipping)

- a) Describe the bodies (and faces) to be used, and how to measure the angle
- b) Measure, for each pair of faces (from the flat surface of the support and the body), the angle at which the body just begins to slide. Make a table showing the coefficient of friction (a minimum of 10-20 measurements are required). Calculate the mean value of the coefficient of friction and the standard deviation of its values, for each pair of faces.
- c) At least in one case, perform a number of measurements of 40-50, and display the histogram of the values obtained by the coefficient of friction. Keep in mind that the way the angle is measured will give the resolution in coefficient of friction (what is the minimum difference in coefficient of friction that can be seen), and this conditions the classes of the histogram that can be done (see a statistic text if needed)
- d) For a body such as a rubber eraser, find the coefficient of friction of two faces of different extensions on the surface, against the same flat surface. Is the coefficient of friction independent of the force per unit area?

You have to deliver a report on this practical work