

Exercise 103: LINEAR EXPANSION OF SOLIDS

Keywords: thermal expansion of solids; atomic interactions as a function of temperature; caliper.

The exercise aims at determining the linear expansion coefficient of selected solids.

Measurements:

1. Measure the initial length of given solid rods by using the built-in caliper.
2. Measure the initial temperature.
3. Heat the rods by using the ultrathermostat and according to the instructions given in class.
4. At each temperature (every 3-5 deg. Celsius) – record the exact temperature and the length increase of all the rods by using the micrometer.
5. When the final temperature is reached (approximately 70 deg. Celsius), continue the measurements while cooling the system down.

Report:

1. Plot the elongation as a function of temperature and determine the slope coefficient.
2. Calculate the linear expansion coefficient α from the relation: $a = \alpha \cdot l_0$ where a is the slope coefficient and l_0 is the initial length.
3. Summarise the results.