

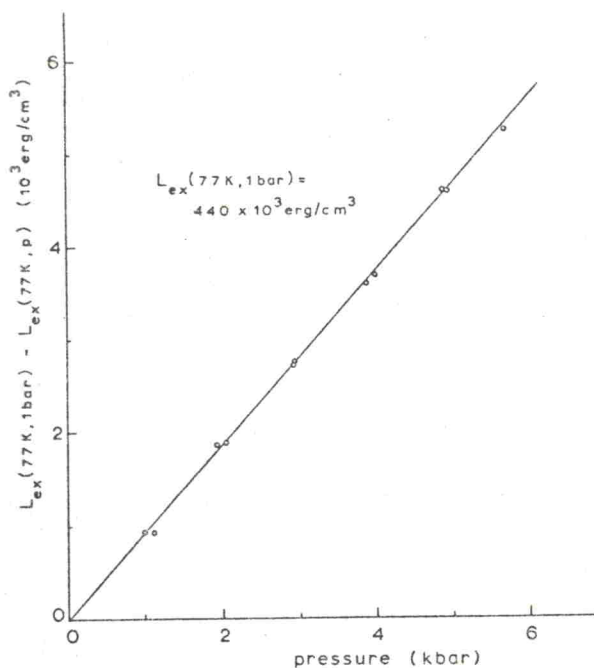


FIG. 1. The effect of pressure on the extremum (L_{ex}) of the magnetic torque curve in the [100]-plane of nickel at 77 K.

At low temperature we were especially interested in the effect of pressure on the higher order contributions to the magnetic anisotropy energy. To study these higher order contributions as a function of pressure we measured accurately the magnetic torque at 60 bar and at 6 kbar over the full range of orientations in the [100]-plane. The analysis of these torque data at 4.2 K is rather complicated, as has been discussed earlier.^{1,7}

The constants B_1 , B_2 , etc. of equation (1) are a bad choice for giving a unique representation of the magnetic torque measurements at this temperature. These constants are, however, very sensitive to small changes in the complicated angle dependence of the anisotropy energy. For that reason we present in Table 1 the constants $B_1, \dots, B_4$ at 4.2 K and B_1 and B_2 at 77 K at the two pressures. Using these constants we have at 4.2 K a rather good, and at 77 K a very good description of the experimental data. From the data in this table it must be concluded that the effect of pressure is only observable for the first anisotropy constant.

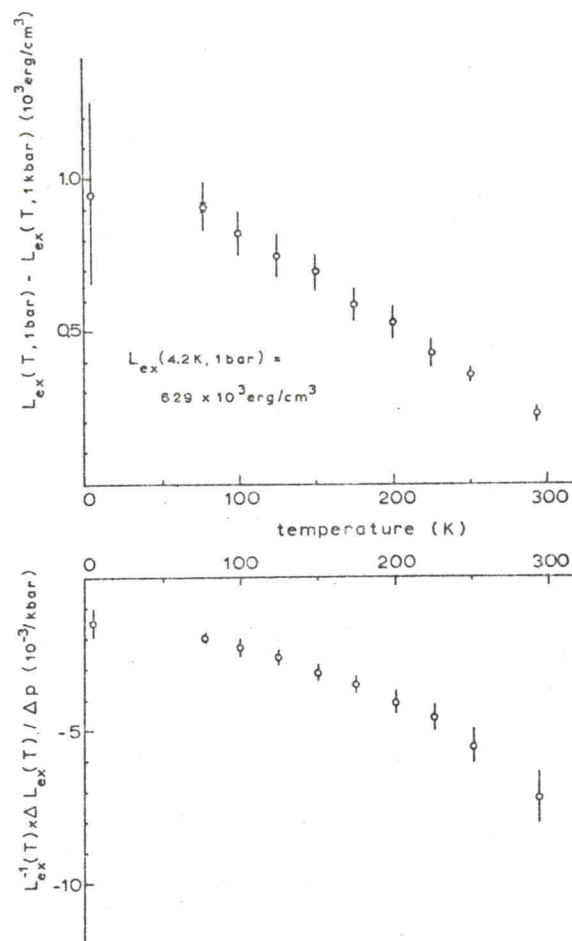


FIG. 2. Absolute and relative change with pressure of the extremum of the magnetic torque curve of nickel as a function of temperature. These data can be interpreted as the absolute and the relative change with pressure of the first anisotropy constant K_1 .

In investigating the behaviour of the magnetic anisotropy energy of nickel at low temperature, experiments have now been performed on this energy as a function of temperature below 4.2 K^{7,8} as a function of the external magnetic field with fields between 10 and 20 koe,⁷ as a function of pressure with pressures up to 6 kbar, and as function of impurity concentrations, with Cu, Co and Fe concentrations between 0.1 and 1 per cent.^{7,9} Only in these latter experiments changes in the complicated angle dependence of the magnetic anisotropy energy of nickel could be observed