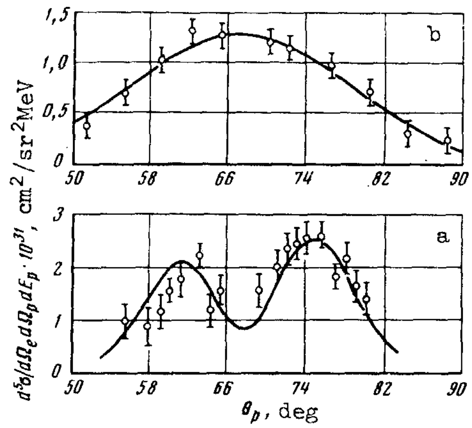
this proton in the target nucleus [2, 3]. Since the momentum $\vec{q}$ is determined uniquely from the kinematics of the reaction, measurement of the angular correlation makes it possible to determine the momentum distribution of the protons inside the nucleus.

The measured angular distribution protons for B = 4 MeV and B = 20 MeV are shown in Figs. a and b, where the cross sections are given with allowance for the radiative corrections (17%) [4]. A comparison of the experimental data with the results of shell-model calculations with an oscillator potential show that the angular distributions for B = 4 MeV and B = 20 MeV correspond to protons knocked out of the 1p and 1s shells of the Li^6 nucleus. The solid lines in the figure show the results of a χ^2-fit of the angular distributions for different values of the parameter of the momentum distribution for the 1p and 1s shells of the Li^6 nucleus, using a computer and the Monte Carlo method with allowance for the energies and angles covered by the measuring apparatus. The momentum-distribution parameters determined by the minimum χ^2 are $q_p = 49.8 \pm 5.0$ MeV/c ($\chi^2 = 25$ for 16 degrees of freedom) and $q_s = 108 \pm 9$ MeV/c ($\chi^2 = 5$ for nine degrees of freedom.



Angular distributions of the protons in the reaction $Li^6(e, e'p)He^5$ at B = 4 MeV (a) and B = 20 MeV (b).

The value of the parameter q_p measured by us for 1p shells differs noticeably from that obtained in the $Li^6(p, 2p)He^5$ reaction [5]. For the 1s shell, our results agree well with the data of [5].

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INFLUENCE OF CONSTANT MAGNETIC FIELD ON THE MAGNITUDE OF THE MAGNETOPLASTIC EFFECT

I.A. Gindin, I.S. Lavrinenko, and I.M. Neklyudov
Physico-technical Institute, Ukrainian Academy of Sciences

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It was shown in [1, 2] that during the course of plastic-deformation an alternating magnetic field causes weakening of nickel single crystals. This phenomenon, called the magnetoplastic effect, was attributed to the interaction between the magnetic domain walls and the dislocations.

Experiments aimed at detecting the magnetoplastic effect in polycrystalline nickel upon application of a magnetic field [2] have confirmed the

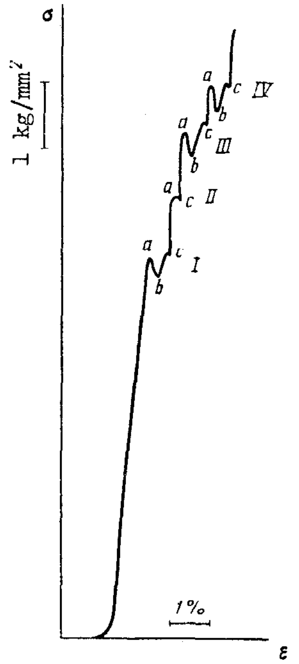

Fig. 1

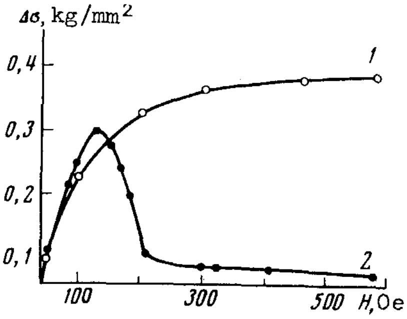

Fig. 2

Fig. 1. Stress diagram of polycrystalline nickel with application of an alternating and a constant magnetic field: a) field turned on, c) field turned off; I) 600 Oe ac field, II) 600 Oe dc field, III) 100 Oe ac field; IV) 100 Oe dc field.

Fig. 2. Magnetoplastic effect vs. the intensity of an ac (1) and dc (2) magnetic field.

correctness and reproducibility of the data in [2]. The effect in polycrystalline nickel turned out to depend on the grain dimension, the degree of deformation, and the magnetic field intensity.

We report here the results of a study of the influence of a constant field on the magnetoplastic effect in polycrystalline nickel.

Samples in the form of rectangular rods measuring 1 × 3 × 50 mm were cut from rolled plates of electrolytic nickel 99.99% pure. After annealing in vacuum for four hours at 1100° C, the samples were stretched at 77°K in a tensile-testing machine with clamps and pull rods of nonmagnetic material. The strain rate was constant at 10^{-3} sec^{-1}. The tension diagram was plotted with an automatic x-y recorder. The magnetic field was produced by a cylindrical solenoid, with the aid of which it was possible to vary the dc or ac field from zero to 1000 Oe. The magnetic field frequency was 50 Hz. The magnetic field intensity vector had the same direction as the axis of the strained sample.

Figure 1 shows a stress diagram of polycrystalline nickel, with ac and dc fields turned on during the course of the plastic deformation. We see that application of the magnetic field is accompanied by a lowering of the flow stress by an amount $\Delta\sigma$ characterizing the magnetoplastic effect in the nickel. The plastic deformation of nickel in a magnetic field, after removal of the flow stress, has a smaller strengthening coefficient $\Delta\sigma/\Delta\varepsilon$ than the strain of the samples without application of a field. The weakening of the nickel following application of a constant field indicates that the magnetoplastic effect is connected not only with vibrations of the boundaries of the magnetic domains under the action of the alternating magnetic field [2], but also with the removal of the domain walls and the realignment of the domain structure.

The greatest interest attaches to the obtained experimental data on the dependence of the magnetoplastic effect on the magnetic field intensity (Fig. 2). In an alternating magnetic field, $\Delta\sigma$ tends to saturate with increasing field intensity. The effect of weakening of nickel with increasing intensity of the dc magnetic field, increases up to 150 Oe, and then decreases abruptly to a low value.

The observed $\Delta\sigma(H)$ plots indicate the existence of two processes that exert opposing influences on the magnetoplastic effect. It can be assumed that an increase of the magnetic field would give rise, on the one hand, to a mechanism of unblocking of the dislocations stopped by the domain walls and to an increase of their mean free paths, owing to the displacement and removal of the magnetic domain walls. This mechanism contributes to the appearance and growth of the magnetoplastic effect. On the other hand, when a high-intensity field is turned on, magnetostriction effects come into play. In addition, the initial stage of reorientation and change of the domain structure prior to the unification of the domains may be accompanied by a break-up of the domains and therefore by an increase in the length of the domain walls [4]. These processes should lead to a strengthening of the crystal [5] and to a reduction of the magnetoplastic effect. With increasing alternating-field intensity, however, the processes that suppress the magnetoplastic effect are less effective than the weakening due to the application of the magnetic field. On the other hand, in a constant magnetic field of high intensity, the contribution of the latter predominates over the weakening, and a maximum is therefore observed on the $\Delta\sigma(H)$ plots. Further investigations will make it possible to determine more definitely the nature of the observed differences between the effect of the constant and alternating magnetic high-intensity field on the magnitude of the magnetoplastic effect.

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ANOMALOUS DECREASE OF THE SHIFT OF THE CENTER OF THE LAMB DIP IN LOW-PRESSURE MOLECULAR GASES

S.N. Bagaev, E.V. Baklanov, and V.P. Chebotaev
Institute of Semiconductor Physics, Siberian Division, USSR Academy of Sciences
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1. We report here, for the first time, observation of a nonlinear dependence of the shift of the center of the Lamb dip on the pressure in molecular gases. The nonlinear character of the shift is due to the influence of the elastic scattering of molecules in the region of widths and pressures when the Doppler frequency shift in scattering is comparable with the impact broadening [1]. The observed features uncover in principle new possibilities for the use of laser spectroscopy to measure elastic-scattering cross sections and to study of the interaction potential of colliding molecules. Our spectroscopic investigations, with relative accuracy 10^{-13}, have been made possible by the appreciable progress in frequency-stabilization methods, proposed in [2 - 4] and based on the use of nonlinear absorption of molecules. We report also that we obtained a reproducibility 3×10^{-14} and high values of short- and long-period frequency stability, 5×10^{-15}. The sharp decrease of the shift of the Lamb dip