determined by equations of the same form, and only the constant β, which characterizes the slope of the T vs. $(v - v_{cr})^2$ curve, changes (Fig. 2).

To obtain a single equation for the coexistence curve near the critical point it is necessary to take into account higher terms in the series expansion of the function $(\partial p/\partial v)_T$, a task beyond the scope of our paper.

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LARGE MAGNETIZATION JUMPS IN IRRADIATED MOLYBDENUM PERMALLOY

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We report below the results of an investigation of the influence of neutron irradiation on the magnetization curve of permalloy with composition 79% Ni, 4% Mo, and 17% Fe. The sample was a bundle of 30 wires ~20 mm long and 50 μ diameter each, placed in a beryllium-oxide capillary for protection against mechanical damage.

Prior to irradiation, the samples were annealed for four hours at 1350°C and cooled with the oven. The coercive force of the samples annealed in this manner was ~0.15 Oe. The annealing prior to irradiation, the subsequent heat treatment, and the irradiation of the samples were all in an argon atmosphere.

The magnetization curves (hysteresis loops) of the samples were obtained with a vibration magnetometer, which differs from the known Foner magnetometer [1] in that it contains a device for automatically compensating the signal. The magnetometer yielded a hysteresis curve within ~15 min, with an error not exceeding 1%. All the measurements were made in quasistatic fields (dH/dt ~ 10^{-3} Oe/sec).

The experiments have shown that irradiation of samples with fast neutrons (integral fluxes from 5 x 10^{16} to 1.5 x 10^{15} neut/cm^2) at a temperature close to 30°C has little effect on their magnetic properties. A noticeable effect on the magnetic properties of the irradiated samples is produced by isochronous annealing at 150 - 200°C. Thus, the coercive force reaches a maximum value, which is about 2.5 times the initial value, after irradiation with 1.5 x 10^{17} fast neut/cm^2 and isochronous annealing to the 250 - 300°C range. After one-hour annealing at 500°C the magnetic properties of the irradiated samples become close to those of the non-irradiated samples.

The results agree with those of Schindler et al. [2].

The investigation also showed that the isochronous annealing of the irradiated samples produced, besides the change in the coercive force and in the residual induction, also steps on the hysteresis loop, i.e., jumps in the magnetization. The number and size of the steps depended on the heat treatment after the irradiation.

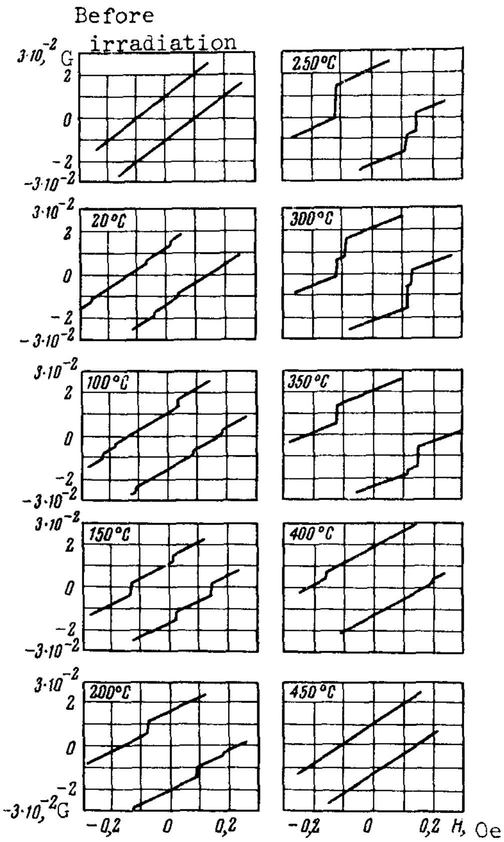

Fig. 1

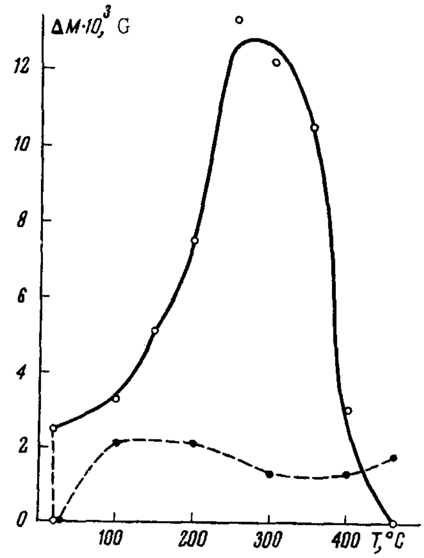

Fig. 2

Figure 1 shows enlarged parts of the hysteresis loops of irradiated permalloy samples after one-hour annealing at different temperatures.

The change in the average value of several large jumps, as a function of the annealing, is shown in Fig. 2. The dashed curve pertains to the non-irradiated (control) sample. The fact that the jumps increase only at higher temperatures and that they are completely annealed-out subsequently may be possibly attributed to the production of complexes of point defects by the irradiation.

From the sizes of the steps we find that portions of the sample, with approximate volume 10^{-5} cm^3, i.e., a volume close to the volume of a whole domain, may experience sudden reversal of magnetization, just as in the so-called "large" Barkhausen jumps observed in polycrystals subjected to tension or torsion [3,4], when the hysteresis loop becomes nearly triangular, and in thin magnetic films [5].

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LOCALIZATION OF SPINS IN A SUPERCONDUCTOR

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There are by now many papers devoted to the influence of magnetic impurities on superconductivity. However, no less important or interesting is the study of the influence of superconductivity on spin localization. Insofar as we know, there are as yet no experimental or theoretical papers on this subject.

Localized magnetic states in a metal were investigated by Friedel [1], Anderson [2], and later by others. This raises the question: does superconductivity enhance or hinder the localization of spins? From the point of view of the ideas of Friedel and Anderson, one can expect localization of a virtual level if its energy lies inside the gap. It follows therefore that superconductivity should contribute to spin localization. Let us consider this question on the basis of Anderson's model [2,5]:

$$H_{os} = \sum_{k\sigma} \varepsilon_k a^+_{k\sigma} a_{k\sigma}, \qquad H_{od} = \sum_{\sigma} E b^+_{d\sigma} b_{d\sigma}, \qquad H_{dd} = \frac{1}{2}\sum_{\sigma} U b^+_{d\sigma} b_{d\sigma} b^+_{d-\sigma} b_{d-\sigma},$$
$$H_{sd} = \sum_{k\sigma} (V_k a^+_{k\sigma} b_{d\sigma} + V^*_k a_{k\sigma} b^+_{d\sigma}). \tag{1}$$

We add the interaction that leads to superconductivity [3]: