Hall effect in weakly doped semiconductors

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The Hall effect is one of the main methods for determining the kinetic properties of various conducting media. To estimate the measured Hall field E_H^x, it is enough to equate its value to the value of the Lorentz force F_{Lor}, acting on free carriers in the volume of the conductor. This "force" interpretation of the phenomenon is usually used, but this definition is approximate. In fact, the stationary Hall state occurs when the accumulation layers $\pm$ appear at the edges $x = \pm d$ of the conducting channel under the action of the Lorentz force F_{Lor}^x. This stationary picture is determined not by the "force" requirement $E_H^x = F_{\mathrm{Lor}}^x$, but by the condition $j_x = 0$ in the direction that limits the channel dimensions, where j_x is the free charge current density in "electrochemical approximation".