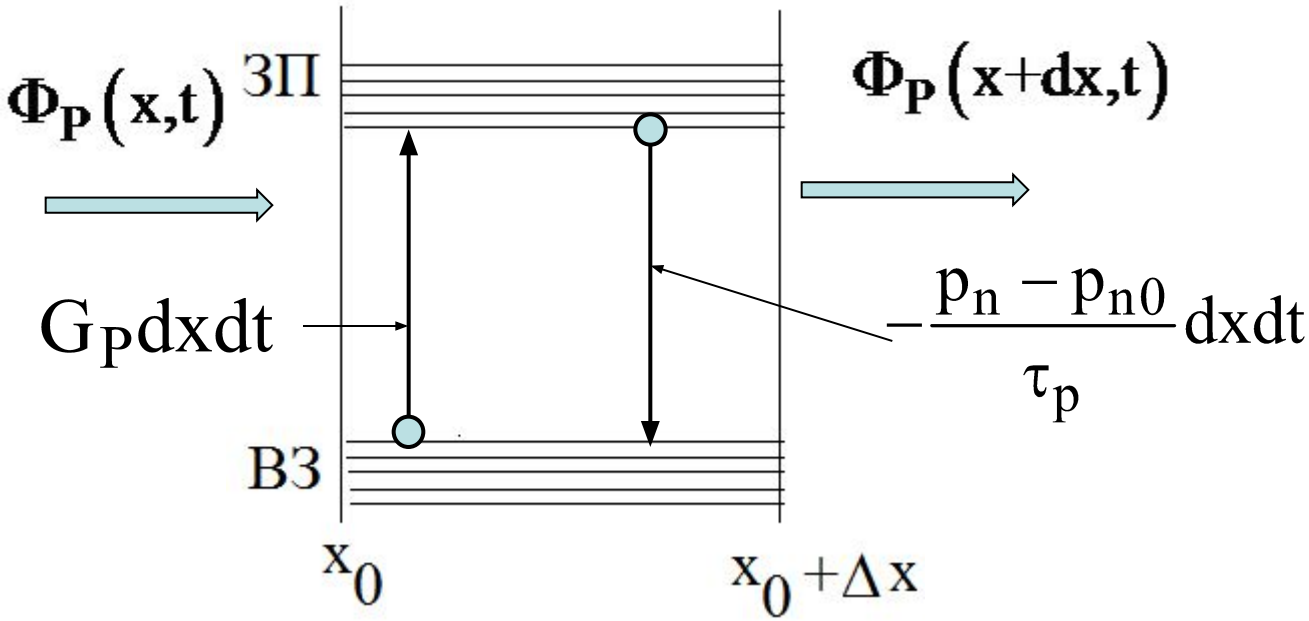
К лекции 8

1.11.3. Уравнение непрерывности



$G_P dxdt -$ $\Phi_P(x,t)$

$-\frac{p_n - p_{n0}}{\tau_p} dxdt -$ $\Phi_P(x+dx,t)$

Основные потоки частиц

$$\left[\Phi_P\left(x+dx,t\right)-\Phi_P\left(x,t\right)\right]dt=\frac{\partial\Phi_P}{\partial x}dxdt \qquad \text{при } dx\to 0$$

$$\left[p_n\left(x,t+dt\right)-p_n\left(x,t\right)\right]dx=\frac{\partial p_n}{\partial t}dxdt, \qquad \text{при } dt\to 0 \quad \to$$

$$\frac{\partial p_n}{\partial t}dxdt=G_p dxdt-\frac{p_n-p_{n0}}{\tau_p}dxdt-\frac{\partial\Phi_p}{\partial x}dxdt$$

$$j_p=e\Phi_p \qquad\qquad j_p=ep_n\mu_p E-eD_p\frac{\partial p_n}{\partial x}$$

Уравнение непрерывности для дырок

$$\boxed{\frac{\partial p_n}{\partial t}=G_p-\frac{p_n-p_{n0}}{\tau_p}-\frac{1}{e}\frac{\partial j_p}{\partial x}}$$

$$\boxed{\frac{\partial p_n}{\partial t}=G_p-\frac{p_n-p_{n0}}{\tau_p}-\frac{\partial}{\partial x}\left[p_n\mu_p E-D_p\frac{\partial p_n}{\partial x}\right]}$$

Уравнение непрерывности для е-нов в п/п р-типа

$$j_n = -e\Phi_n$$

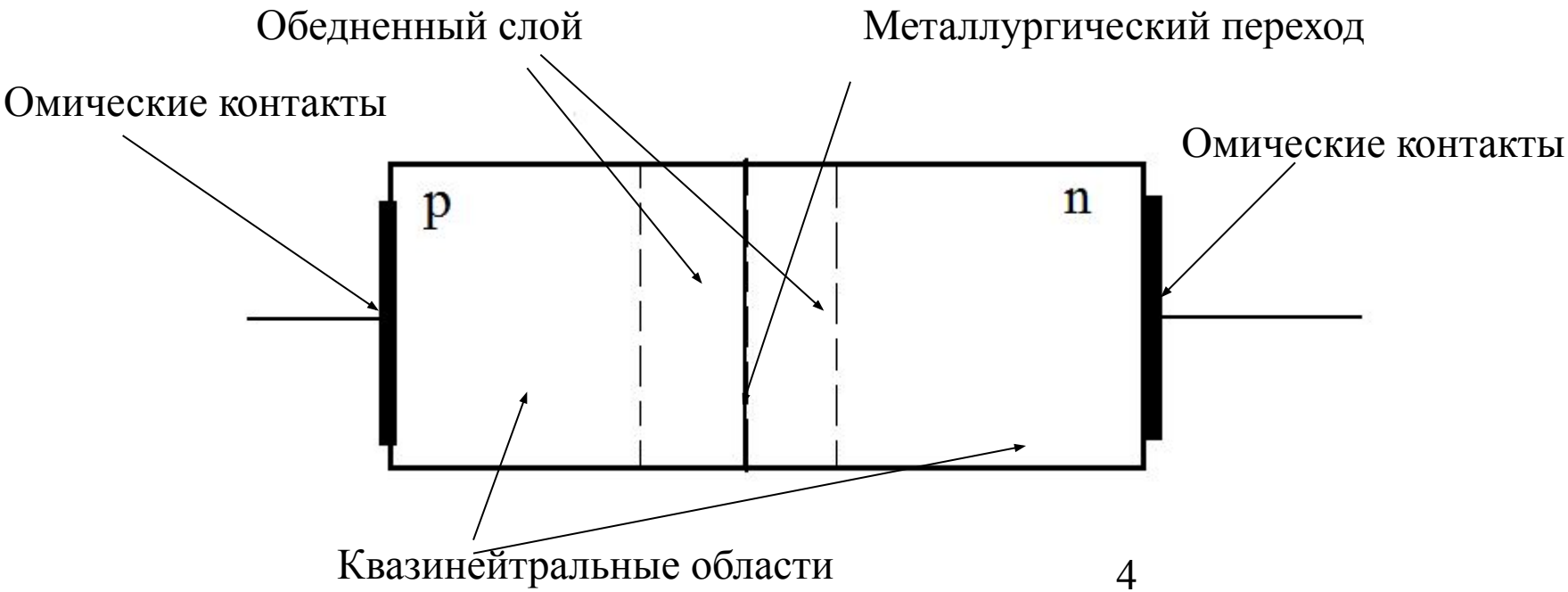
$$j_n = en_p\mu_n E + eD_n \frac{\partial n_p}{\partial x}$$

$$\frac{\partial n_p}{\partial t} = G_n - \frac{n_p - n_{p0}}{\tau_n} - \frac{\partial}{\partial x}\left[n_p\mu_n E + D_n \frac{\partial n_p}{\partial x} \right]$$

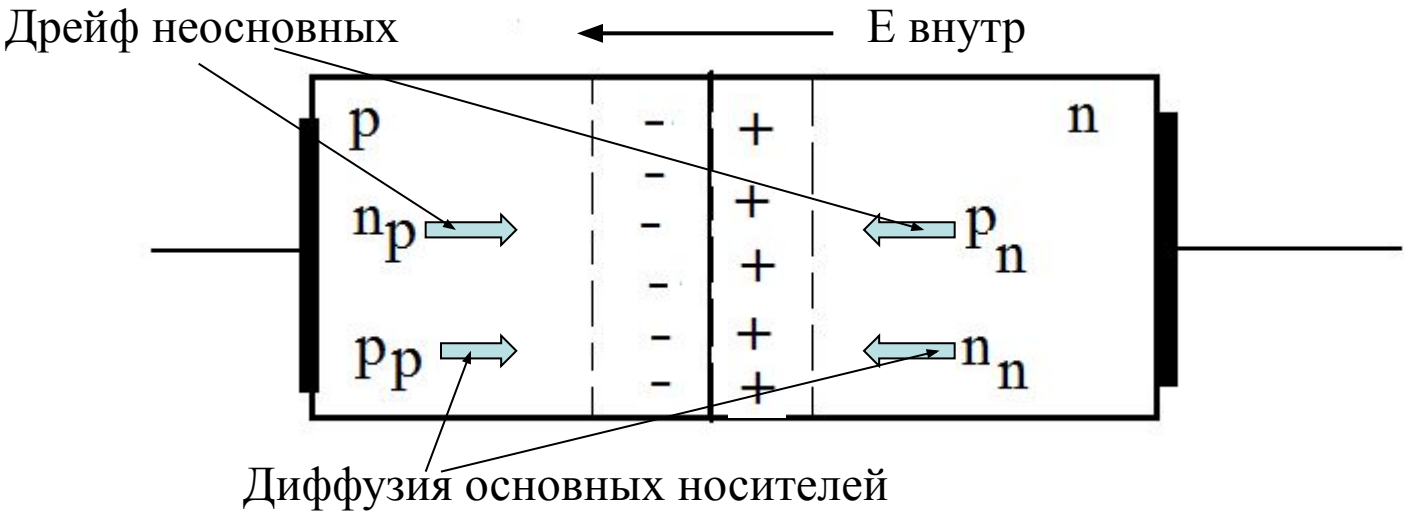
2. Контактные явления на границе областей с электронной и дырочной проводимостями. P-n переход и его свойства

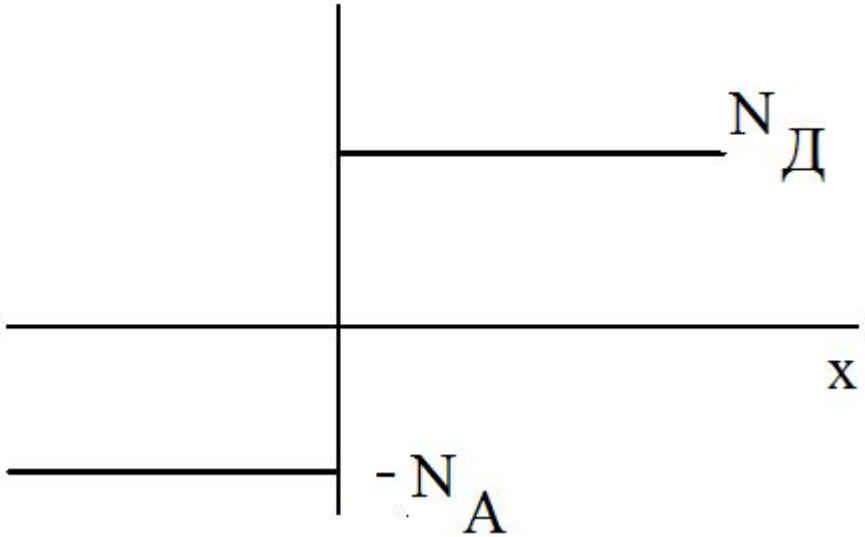
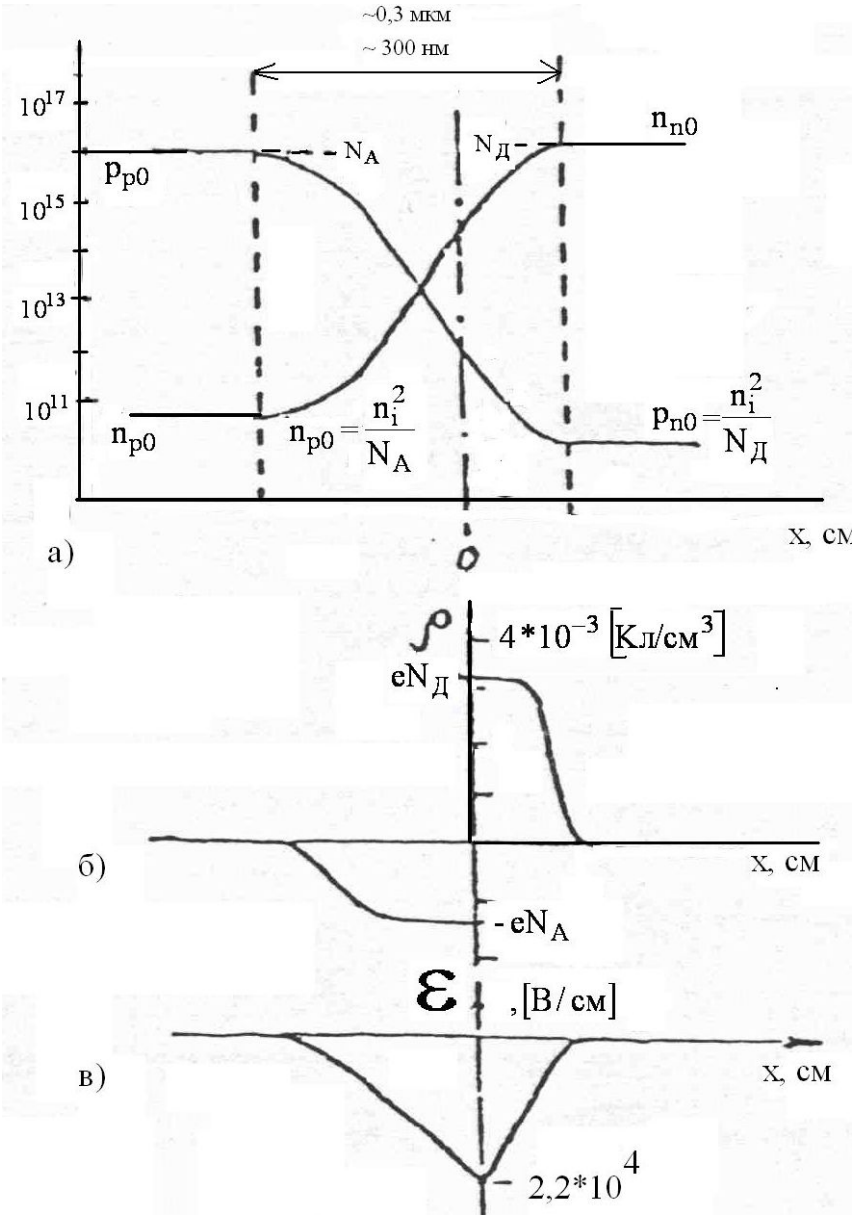
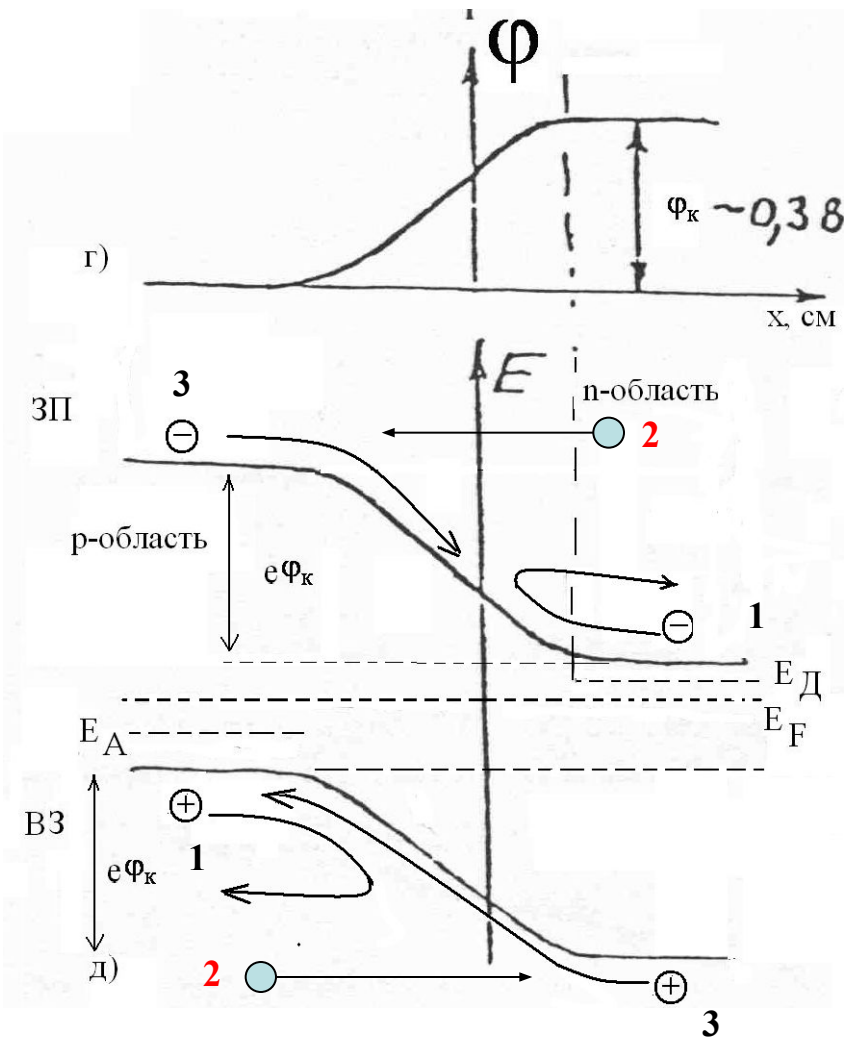
2.1 Структура p-n перехода

Одномерная теоретическая модель



2.1.1 Ступенчатый (резкий) p-n переход





Точное решение уравнения непрерывности