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Current components for an npn BJT in active mode (BE junction forward-biased $V_{BE} > 0$ and BC junction reverse-biased $V_{BC} < 0$)

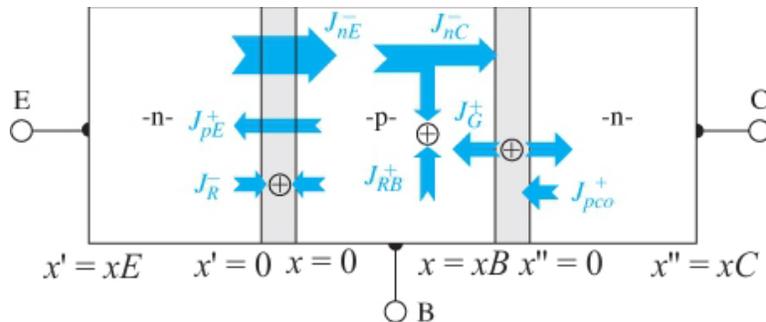


Figure 12.18 | Particle current density or flux components in an npn bipolar transistor operating in the forward-active mode.

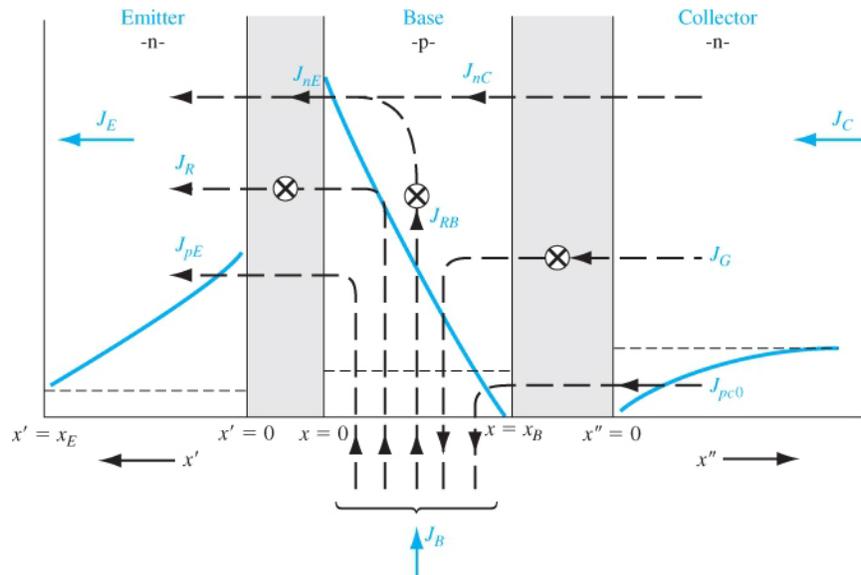


Figure 12.19 | Current density components in an npn bipolar transistor operating in the forward-active mode.

J_{nE}^- = Diffusion of minority carrier **electrons** in the base at $x = 0$.

J_{nC}^- = Diffusion of minority carrier **electrons** in the base at $x = x_B$.

J_{RB}^+ = Difference of J_{nE}^- and J_{nC}^- representing **recombination of electrons** in the base. I.e., this is the flow of holes into the base to replace those lost to recombination.

J_{pE}^+ = Diffusion of minority carrier **holes** in the emitter at $x' = 0$.

J_R^- = Recombination of carriers in the forward-biased BE pn junction

J_{pC0}^+ = Diffusion of minority carrier **holes** in the collector at $x'' = 0$.

J_G^+ = Generation of carriers in the reverse-biased BC pn junction.