

$$\begin{aligned}
& j_n(E, -w_p) \\
&= -\frac{q(1-R)b_s\alpha L_n}{(\alpha^2 L_n^2 - 1)} \\
&\times \left\{ \frac{e^{-\alpha(x_p - w_p)} \left(\frac{S_n L_n}{D_n} \cosh \frac{(x_p - w_p)}{L_n} + \sinh \frac{(x_p - w_p)}{L_n} \right) - \left(\frac{S_n L_n}{D_n} + \alpha L_n \right)}{\frac{S_n L_n}{D_n} \sinh \frac{(x_p - w_p)}{L_n} + \cosh \frac{(x_p - w_p)}{L_n}} \right. \\
&\quad \left. + \alpha L_n e^{-\alpha(x_p - w_p)} \right\} \\
&+ \frac{qD_n n_0 (e^{qV/k_B T} - 1)}{L_n} \left\{ \frac{\frac{S_n L_n}{D_n} \cosh \frac{(x_p - w_p)}{L_n} + \sinh \frac{(x_p - w_p)}{L_n}}{\frac{S_n L_n}{D_n} \sinh \frac{(x_p - w_p)}{L_n} + \cosh \frac{(x_p - w_p)}{L_n}} \right\} \quad (6.34)
\end{aligned}$$

$$\begin{aligned}
& j_p(E, w_n) \\
&= \left[\frac{qb_s(1-R)\alpha L_p}{(\alpha^2 L_p^2 - 1)} \right] e^{-\alpha(x_p + w_n)} \left\{ \alpha L_p \right. \\
&\quad \left. - \frac{\frac{S_p L_p}{D_p} (\cosh \frac{(x_n - w_n)}{L_p} - e^{-\alpha(x_n - w_n)}) + \sinh \frac{(x_n - w_n)}{L_p} + \alpha L_p e^{-\alpha(x_n - w_n)}}{\frac{S_p L_p}{D_p} \sinh \frac{(x_n - w_n)}{L_p} + \cosh \frac{(x_n - w_n)}{L_p}} \right\}. \quad (6.63)
\end{aligned}$$