

(15)

$$\delta_{n,\pm 1} \longrightarrow \delta_{n,0} + (e^{ika} + e^{-ika})$$

$$\sum_n e^{ikna} \left\{ \epsilon_s \delta_{n,0} - t \left[\delta_{n,0} \left(\downarrow \right) \right] \right\} = \epsilon_k \sum_n e^{ikna} \delta_{n,0}$$

$$\epsilon_s \sum_n e^{ikna} \delta_{n,0} - t (e^{ika} + e^{-ika}) \sum_n e^{ikna} \delta_{n,0} = \epsilon_k \sum_n e^{ikna} \delta_{n,0}$$

$$\epsilon_s - 2t \cos(ka) = \epsilon_k$$

$$\begin{aligned} & \epsilon_s - 2t \cos(ka) \\ & \epsilon_s - 2t (\cos ka + i \sin ka + \cos ka - i \sin ka) \\ & \epsilon_s - 2t \cos ka \end{aligned}$$