$$\min \; C\sum_{n=1}^{N}(\xi_n+\hat{\xi}_n)+\frac{1}{2}\|\underline{w}\|^2 + \begin{cases}\xi_n \geq 0\\ \hat{\xi}_n \geq 0\end{cases}$$

LAGRANGE MULTIPLIERS: $a_n, \hat{a}_n, \mu_n, \hat{\mu}_n$ (ALL $\geq \phi$)

$$\boxed{L = C\sum(\xi_n+\hat{\xi}_n)+\frac{1}{2}\|\underline{w}\|^2 -}$$

ε, t_n, y_n

(EQU 7.56)

$$\frac{\partial L}{\partial \underline{w}}, \frac{\partial L}{\partial b}, \frac{\partial L}{\partial \xi_n}, \frac{\partial L}{\partial \hat{\xi}_n} = \phi$$

$$\begin{cases} \underline{w} = \sum_{n=1}^{N}(a_n-\hat{a}_n)\phi(\underline{x}_n) \\ \sum_{n=1}^{N}(a_n-\hat{a}_n)=\phi \\ a_n+\mu_n = C \\ \hat{a}_n+\hat{\mu}_n = C \end{cases}$$

$$\boxed{\begin{aligned}\tilde{L}(\underline{a},\hat{\underline{a}}) = & -\frac{1}{2}\sum_n\sum_m (a_n-\hat{a}_n)(a_m-\hat{a}_m)\,k(\underline{x}_n,\underline{x}_m) \\ & -\varepsilon\sum_{n=1}^{N}(a_n+\hat{a}_n)+\sum_{n=1}^{N}(a_n-\hat{a}_n)t_n \\ & 0\leq a_n \leq C \\ & 0 \leq \hat{a}_n \leq C\end{aligned}}$$

$$\boxed{y(\underline{x}) = \sum_{n=1}^{N}(a_n-\hat{a}_n)\,k(\underline{x},\underline{x}_n)+b}$$ SOLUTION MODEL

KKT CONDITIONS: SUPPORT VECTORS ($a_n \neq \phi$ OR $\hat{a}_n \neq \phi$)
ON/OUTSIDE TUBE ($\xi_n = 0$, $\xi_n > 0$)
POINTS WITHIN THE TUBE: $a_n = \hat{a}_n = \phi$

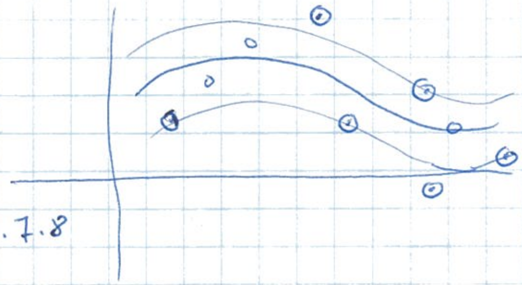

FIG. 7.8