

**6.25** Using 4.92, 6.81 and 6.82, we have:

$$\begin{aligned}
\mathbf{a}_N^{\text{new}} &= \mathbf{a}_N - \mathbf{H}^{-1} \nabla E(\mathbf{a}_N) \\
&= \mathbf{a}_N - (\mathbf{W}_N + \mathbf{C}_N^{-1})^{-1} (\mathbf{t}_N - \boldsymbol{\sigma}_N - \mathbf{C}_N^{-1} \mathbf{a}_N) \\
&= (\mathbf{W}_N + \mathbf{C}_N^{-1})^{-1} (\mathbf{W}_N + \mathbf{C}_N^{-1}) \mathbf{a}_N - (\mathbf{W}_N + \mathbf{C}_N^{-1})^{-1} (\mathbf{t}_N - \boldsymbol{\sigma}_N - \mathbf{C}_N^{-1} \mathbf{a}_N) \\
&= (\mathbf{W}_N + \mathbf{C}_N^{-1})^{-1} ((\mathbf{W}_N + \mathbf{C}_N^{-1}) \mathbf{a}_N + \mathbf{t}_N - \boldsymbol{\sigma}_N - \mathbf{C}_N^{-1} \mathbf{a}_N) \\
&= (\mathbf{W}_N + \mathbf{C}_N^{-1})^{-1} (\mathbf{t}_N - \boldsymbol{\sigma}_N + \mathbf{W}_N \mathbf{a}_N) \\
&= (\mathbf{C}_N^{-1} + \mathbf{W}_N)^{-1} (\mathbf{t}_N - \boldsymbol{\sigma}_N + \mathbf{W}_N \mathbf{a}_N) \\
&= ((\mathbf{I} + \mathbf{W}_N \mathbf{C}_N) \mathbf{C}_N^{-1})^{-1} (\mathbf{t}_N - \boldsymbol{\sigma}_N + \mathbf{W}_N \mathbf{a}_N) \\
&\implies \mathbf{a}_N^{\text{new}} = \mathbf{C}_N (\mathbf{I} + \mathbf{W}_N \mathbf{C}_N)^{-1} (\mathbf{t}_N - \boldsymbol{\sigma}_N + \mathbf{W}_N \mathbf{a}_N)
\end{aligned}$$

which is the same as the result in 6.83.