$$P(\{\mathbf{X}\}_t|\mathbf{F}, \mathbf{D}) = \prod_t P(\Delta \mathbf{X}_t|\mathbf{F}(\mathbf{X_t}), \mathbf{D}(\mathbf{X_t})) \approx \prod_t \exp\left(-\frac{\zeta_t^2}{2}\right) \qquad (1)$$

$$\zeta_t \approx \left(\frac{2\mathbf{D}(\mathbf{X}_t)}{\Delta t}\right)^{-1/2} (\Delta \mathbf{X}_t - \mathbf{F}(\mathbf{X}_t)\Delta t) \qquad (2)$$

$$P(\{\mathbf{X}\}_t|\mathbf{F}, \mathbf{D}) = \prod_t \frac{1}{(4\pi\Delta t \det D(\mathbf{X}_t))^{1/2}} \exp\left[-\frac{1}{4}\sum_t \left(\frac{\Delta \mathbf{X}_t}{\Delta t} - \mathbf{F}(\mathbf{X}_t)\right) \mathbf{D}^{-1}(\mathbf{X}_t)\left(\frac{\Delta \mathbf{X}_t}{\Delta t} - \mathbf{F}(\mathbf{X}_t)\right)\right]$$
$$(3)$$