```
K \\ \theta \in \\ R^d \\ K \\ \mathbf{x}(t) = \\ [
       \mathbf{x}(t) = [x_1(t), \dots, x_K(t)]^T
\dot{\mathbf{x}}(t) = \frac{d\mathbf{x}(t)}{dt} = \mathbf{f}(\mathbf{x}(t), \theta)(1)
       \mathbf{Y}(\mathbf{x}(t), \theta)(1)
\mathbf{Y}(t)
\mathbf{K}
\mathbf{E} \approx \mathbf{E} \approx \mathbf{E} \approx \mathbf{0}, \mathbf{D}
\mathbf{D}_{ik} = \mathbf{\sigma}_{k}^{2} \delta_{ik}
\mathbf{Y} = \mathbf{E} \approx \mathbf{V}
     \mathbf{X} + \mathbf{Y} = \mathbf{E}
       \begin{split} \mathbf{\overline{E}}' \\ \mathbf{X} &= \\ [\mathbf{x}(t_1), \dots, \mathbf{x}(t_N)] &= \\ [\mathbf{x}_1, \dots, \mathbf{x}_K]^T \\ \mathbf{Y} &= \\ [\mathbf{y}(t_1), \dots, \mathbf{y}(t_N)] &= \\ [\mathbf{y}_1, \dots, \mathbf{y}_K]^T \\ \mathbf{x}_k &= \\ [x_k(t_1), \dots, x_k(t_N)]^T \\ \mathbf{\hat{y}}_k &= \\ [y_k(t_1), \dots, y_k(t_N)]^T \\ .... y_k(t_N)]^T \end{split}
\mathbf{X}_{u}^{(1)}, y_{k}(t_{N})]^{T}

\begin{array}{l}
\mathbf{X}_{u} \\
f_{k}(\mathbf{x}(t), \theta) = \\
\sum_{i=1} \theta_{ki} \prod_{j \in \mathcal{M}_{ki}} x_{j}(2) \\
\mathcal{M}_{ki} \subseteq \\
\{1, \dots, K\} \\
\begin{pmatrix} \mathbf{X} \\ \mathbf{X} \end{pmatrix} \sim \\
\mathcal{N} \begin{pmatrix} \mathbf{X} \\ \mathbf{X} \\ \mathbf{Y} \end{pmatrix} \begin{pmatrix} \mathbf{C}_{\phi} \mathbf{C}'_{\phi} \\ \mathbf{X}' \\ \mathbf{C}_{\phi} \mathbf{C}'_{\phi} \end{pmatrix} (3) \\
cov(x_{k}(t), x_{k}(t)) = \\
C_{\phi_{k}}(t, t') \\
cov(\dot{x}_{k}(t), x_{k}(t)) =
\end{array}

     C'_{\phi_k}(t,t') = \frac{CC_{\phi_k}(t,t')}{CC'_{\phi_k}(t,t')} = \frac{\partial CC_{\phi_k}(t,t')}{\partial t} = 0
                                                                cov(x_k(t), \dot{x}_k(t)) =
       \begin{array}{l} \operatorname{cov}(x_{k}(t),\dot{x}_{k}(t)) = \\ \frac{\partial C_{\phi_{k}}(t,t')}{\partial t'} = : \\ {}'C_{\phi_{k}}(t,t') \\ \operatorname{cov}(\dot{x}_{k}(t),\dot{x}_{k}(t)) = \\ \frac{\partial C_{\phi_{k}}(t,t')}{\partial t \partial t'} = : \\ \mathbf{\ddot{X}} = \\ \mathbf{\ddot{F}}_{1},\epsilon_{1} \sim \\ \mathcal{N}\left(\epsilon_{1};\mathbf{0},\mathbf{I}\gamma\right) \\ \mathbf{\ddot{X}} = \\ {}'\mathbf{C}_{\phi}\mathbf{C}_{\phi}^{-1}\mathbf{\ddot{X}} + \\ \epsilon_{2},\epsilon_{2} \sim \\ \mathcal{N}\left(\epsilon_{2};\mathbf{0},\mathbf{A}\right) \\ \mathbf{\ddot{F}} : = \\ \mathcal{N}\left(\mathbf{\ddot{Y}}_{1},\mathbf{\ddot{Y}}\right) \end{array}
       \begin{array}{l} \tilde{\mathcal{N}}\left(\epsilon_{2};\mathbf{0},\mathbf{A}\right) \\ \tilde{\mathbf{F}} & \coloneqq \\ \tilde{\mathbf{f}}(\tilde{\mathbf{X}},\theta) \\ \tilde{\mathbf{A}} & \coloneqq \\ \tilde{\mathbf{C}}_{\phi}^{\prime\prime} - \\ \mathbf{C}_{\phi}^{\prime} \mathbf{C}_{\phi}^{-1} \mathbf{C}_{\phi}^{\prime} \\ \tilde{\mathbf{X}} \\ \tilde{\mathbf{Y}} \\ \tilde{\mathbf{C}}_{\phi} \mathbf{C}_{\phi}^{-1} \mathbf{X} + \\ \epsilon_{0}(4) \\ \epsilon_{0} & \coloneqq \\ \epsilon_{2} - \\ \epsilon_{1} \\ \theta \end{array}
```