Central Limit Theorem:

$$\frac{d\boldsymbol{x}}{dt} = \varepsilon \boldsymbol{F}(\boldsymbol{x},t) + \varepsilon^2 \boldsymbol{G}(\boldsymbol{x},t)$$

Introduce scaled time $s = \varepsilon^2 t$, so

$$\frac{d\boldsymbol{x}}{ds} = \frac{1}{\varepsilon}\boldsymbol{F}(\boldsymbol{x},s/\varepsilon^2) + \boldsymbol{G}(\boldsymbol{x},s/\varepsilon^2).$$

Special case:

let $F_i = \sum_k F_i^k(\boldsymbol{x},s)\,\eta_k(s/\varepsilon^2)$.

Define $C_{km} = \int_{-\infty}^{\infty} <\eta_k(t)\eta_m(t+t')> dt$.

Then, in the limit of long times ($t\rightarrow\infty$) and small ε ($\varepsilon\rightarrow 0$; we'll get to what ε is later), the conditional pdf $p(\boldsymbol{x},s|\,\boldsymbol{x}_o,s_o)$ satisfies a Fokker-Planck equation *in the scaled coordinates,* with

$$\mathbf{S}(\boldsymbol{x},s)\mathbf{S}^{\mathrm{T}}(\boldsymbol{x},s) = \mathbf{F}(\boldsymbol{x},s/\varepsilon^2)\mathbf{C}\mathbf{F}^{\mathrm{T}}(\boldsymbol{x},s/\varepsilon^2)$$