

# simStateSpace: Staging

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Convert OU to SSM.

$$\boldsymbol{\beta} = \exp(-\boldsymbol{\Phi} \Delta_t) \quad (1)$$

$$\boldsymbol{\alpha} = -\boldsymbol{\Phi}^{-1}(\boldsymbol{\beta} - \boldsymbol{I}_p) \quad (2)$$

$$\text{vec}(\boldsymbol{\Psi}) = \{ [(-\boldsymbol{\Phi} \otimes \boldsymbol{I}_p) + (\boldsymbol{I}_p \otimes -\boldsymbol{\Phi})] [\exp([(-\boldsymbol{\Phi} \otimes \boldsymbol{I}_p) + (\boldsymbol{I}_p \otimes -\boldsymbol{\Phi})] \Delta_t) - \boldsymbol{I}_{p \times p}] \text{vec}(\boldsymbol{\Sigma}) \} \quad (3)$$

## References

R Core Team. (2024). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. <https://www.R-project.org/>