

Documentation of the MATLAB function VARcovfun.m

The function's arguments and returned quantities are listed in the help section of the function which is reproduced below.

```
function G=VARcovfun(Phi,SigPhi,K)
% forms the covariance function G up to lag K of a VAR model
% with coefficients Phi and innovation variance SigPhi
%
% Method: the numerator of the covariance generating function (CGF) is determined
% then the CGF is expanded.
%
% G(:, :, 1) is the lag zero covariance matrix or series variance
% G(:, :, k+1) is the lag k covariance matrix
```

To be specific, the given array Phi has elements $\text{Phi}(i, j, k)$ which are coefficients Φ_{ijk} for $i, j = 1 \dots m$ and $k = 1 \dots p$ of matrices Φ_k . These are the coefficients of a VAR(p) model for a process x_t , whose dimension m and order p are inferred from the size of Phi. The given quantity SigPhi is the innovation variance of the model which is

$$x_t = \Phi_1 x_{t-1} + \Phi_2 x_{t-2} + \dots + \Phi_p x_{t-p} + e_t. \quad (1)$$

The returned quantity G has elements $G(i, j, k+1)$ which are coefficients Γ_{ijk} for $i, j = 1 \dots m$ and $k = 0 \dots K$ of the lagged covariance matrices Γ_k of the process defined by

$$\Gamma_{ijk} = \text{Cov}(x_{i,t}, x_{j,t-k}).$$

A document describing the method by which these covariances are derived is given in the Derivations/Proofs pages for Chapter 2.