Documentation of the MATLAB function `VARcovfunX.m`

This action of this function is identical (within numerical precision) to that of `VARcovfun.m`, but it uses a somewhat different method of calculation.

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

```
function G=VARcovfunX(Phi,SigPhi,K)
% forms the covariance function G up to lag K of a VAR model
% with coefficients Phi and innovation variance SigPhi
%
% The Yule Walker equations are re-arranged and solved
%
% 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 `Phi(i,j,k)` which are coefficients $\Phi_{i\,j\,k}$ for $i, j = 1 \ldots m$ and $k = 1 \ldots p$ 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

$$x_t = \Phi_1 x_{t-1} + \Phi_2 x_{t-2} + \cdots + \Phi_p x_{t-p} + e_t. \tag{1}$$

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

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

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