TOOLBOX DESCRIPTION

LINEAR MODEL-BASED ESTIMATION

- `bim_mos_idVAR`: model order selection for identification of a strictly causal vector autoregressive (VAR) model
- `bim_idVAR`: general linear regression modelling through least squares model identification
- `bim_VARspectra`: VAR spectral matrices (transfer function and power spectral density - PSD)
- `bim_fGC_lin`: frequency domain bivariate Granger Causality (GC), Total Dependence (TD) and Instantaneous Causality (IC) from the PSD of a VAR model

Resolution of the Yule-Walker (YW) equations

- `bim_Yule`: solution of the YW equations for a VAR process (using discrete time Lyapunov equation)
- `bim_LinReg`: linear regression of random processes through resolution of the YW equations; performs linear regression of the present state of given target processes from the past states of given driver processes
- `bim_MIRdec_lin_YW`: performs computation of the mutual information rate (MIR) and the causal terms of its decomposition (transfer entropies – TE – and instantaneous transfer – IT) in the time and spectral domains; estimation through resolution of the YW equations

State-space (SS) models

- `bim_SSmodel`: computation of SS model parameters [A,C,K] from VAR model parameters [Am]
- `bim_submodel`: derivation of a submodel (i.e., a reduced model) of a state space (SS) model
- `bim_MIRdec_lin_SS`: performs computation of the mutual information rate (MIR) and the causal terms of its decomposition (TE, IT) in the time and spectral domains; estimation through SS models

MODEL-FREE ESTIMATION

- `bim_MIRdec_knn`: decomposition of the MIR into TEs and IT through the k-nearest neighbors (KNN) estimator
- `bim_MIRdec_bin`: decomposition of the MIR into TEs and IT through the binning estimator
- `bim_MIRdec_perm`: decomposition of the MIR into TEs and IT through the permutation estimator
- `bim_H`: entropy of a discrete multidimensional variable (logarithm of the probability distribution)

- `bim_quantization`: quantization of the input series with a given number of quantization levels – used for binning estimator
- `bim_ObsMat`: computation of the observation matrix (for entropy computation)
- `bim_SetLag`: sets the vector of indexes for series and lags to be used for conditioning

OTHER FUNCTIONS

- `bim_AR_filter`: autoregressive low-pass, high-pass filter for pre-processing
- `bim_surrtimeshift`: time shifted surrogates (makes use of a circular shift with a minimum number of shifted samples)
- `bim_WCspectra`: non-parametric power spectral density via weighted covariance estimator