Wold's Theorem

In statistics, Wold's decomposition or the Wold representation theorem (not to be confused with the Wold theorem that is the discrete-time analog of the Wiener-Khinchin theorem) named after Herman Wold, says that every covariance-stationary time series Y_t can be written as the sum of two time series, one deterministic and one stochastic.
Formally

$$Y_t = \sum_{j=0}^{\infty} b_j \epsilon_{t-j} + \nu_t$$

where:

* Y_t is the time series being considered,
* ϵ is an uncorrelated sequence which is the innovation process to the process Y_t- that is, a white noise process that is input to the linear filter $\{b_j\}$.
* b is the *possibly* infinite vector of moving average weights (coefficients or paramaters)
* ν_t is a deterministic time series, such as one represented by a sine wave.