$$E\left( u_{t-k} \sum_j \alpha_j u_{t-j} = u_{t-k} \varepsilon_t \right)$$

Yule-Walker: $\rho_k + \alpha_1 \rho_{k-1} + \cdots \alpha_h \rho_{k-h} = 0 \quad k > 0$

since $\rho_{-j} = \rho_j$:

$$\rho_1 + \underline{\alpha_1} + \alpha_2 \rho_1 + \cdots \alpha_h \rho_{h-1} = 0$$

$$\rho_2 + \alpha_1 \rho_1 + \underline{\alpha_2} + \cdots$$

$$\vdots$$

$$E\left( u_{t+k} \cdot u_t = u_{t+k} \sum_{j=1}^{h} A_j z_j^t \right) \quad k \geq 0$$

Wold: $\rho_k + \alpha_1 \rho_{k+1} \quad \alpha_h \rho_{k+h} = \frac{\text{var}\,\varepsilon}{\text{var}\,u} B_k$

Markoff series:

$$u_t + \alpha_1 u_{t-1} = \varepsilon_t$$

$$\equiv u_t - \rho u_{t-1} = \varepsilon_t$$

$$[1 - \rho D] u_t = \varepsilon_t$$

$$u_t = \frac{\varepsilon_t}{1 - \rho D} = \varepsilon_t [1 + \rho D + \rho^2 D^2 \cdots] = \left( \sum B_j D^j \right) \varepsilon_t$$

$$B_j = \rho^j$$

$$\text{var}\,u = \text{var} \left\{ \sum_{j=0}^{\infty} \rho^j \varepsilon_{t-j} \right\} = \text{var}\,\varepsilon \sum^{\infty} \rho^{2j} = \frac{\text{var}\,\varepsilon}{1 - \rho^2}$$

from Yule-Walker $\quad \rho_j - \rho \rho_{j-1} = 0$

$$\rho_1 = \rho$$

$$\rho_k = \rho^k$$