Power Convergent Matrices

Definition: An eigenvalue λ_i of A is called regular if $\nu_A(\lambda) = m_A(\lambda)$, and is called dominant if $|\lambda_j| < |\lambda_i|$, for all eigenvalues $\lambda_j \neq \lambda_i$.

Theorem 6: An $m \times m$ matrix A is power convergent if and only if
either: $|\lambda_i| < 1$, for all eigenvalues λ_i of A,
or: 1 is a regular, dominant eigenvalue of A.

Theorem 7: If $|\lambda_i| < 1$ for every eigenvalue λ_i of A, then A is power convergent and

$$\lim_{n\to\infty} A^n = 0.$$

Theorem 8: If $\lambda_1 = 1$ is a regular, dominant eigenvalue of A, then A is power convergent and

$$\lim_{n\to\infty} A^n = E_{10} \neq 0,$$

where E_{10} denotes the lowest order constituent matrix of A which is associated to the eigenvalue $\lambda_1 = 1$. Moreover, the other constituent matrices associated to λ_1 are all zero:

$$E_{11} = E_{12} = \ldots = E_{1m_1-1} = 0.$$