ψ^n **Expansion for Matrix Multiplication**

$$\psi(A) \cdot \psi(B) = \psi(A \cdot B)$$

- $\psi_{WPx}(A) \neq \psi^x(A)$ where $\psi_{WPx}(A)$ is the x resolution of wavelet transform packets (full decomposition) except for $x = 1$.
- $\psi_{Wx}(A) \neq \psi^x(A)$ where $\psi_{Wx}(A)$ is the x resolution of wavelet transform pyramids except for $x = 1$.

$$\psi^2(A) \cdot \psi^2(B) = \psi^2(A \cdot B)$$

Proof:
The theorem

$$\psi(A) \cdot \psi(B) = \psi(A \cdot B)$$

is proven as fact.

$$\psi^2(A) = \psi(\psi(A))$$

$$\psi^2(A) = \cdot\psi^2(B) = \psi(\psi(A)) \cdot \psi(\psi(B))$$

$$\psi(\psi(A)) \cdot \psi(\psi(B)) = \psi(\psi(A) \cdot \psi(B))$$

$$\psi(\psi(A) \cdot \psi(B)) = \psi(\psi(A \cdot (B))$$

$$\psi(\psi(A \cdot (B)) = \psi^2(A \cdot B)$$

$$\psi^2(A) \cdot \psi^2(B) = \psi^2(A \cdot B)$$