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Macroelements and Orthogonal Multiresolutional Analysis

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Poster Presentation 29

MACROELEMENTS AND ORTHOGONAL MULTIRESOLUTIONAL ANALYSIS

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Orthogonal multiresolutional wavelet analysis in two dimensions furnishes a basis for wavelet analysis. Bernstein-Bezier polynomials over simplexes provide elegant expressions of the necessary and sufficient conditions for a shift invariant space generating an orthogonal multiresolution analysis. In order to give the expression a formula of the inner product of two Bernstein-Bezier polynomials over a simplex has been derived:

$$\langle P_n, Q_n \rangle = \int_S P_n Q_n(X) dX = s\,\Delta_s \frac{(n!)^2}{(2n+s)!} \sum_i \sum_j a_i b_j \Pi_{k=1}^{s} \binom{ik+jk}{ik}$$

where V_s is the volume of the s-dimensional simplex S, $\mathbb{i} = i_1+i_2+\ldots+i_S$, $\mathbb{j} = j_1+j_2+\ldots+j_S$, and $\mathbb{a}_{\mathbb{i}}$ and $\mathbb{b}_{\mathbb{j}}$ are respective Bernstein-Bezier coefficients of P_n and A_n. We also give the needed expression by using the formula above.