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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:

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

where V_s is the volume of the s -dimensional simplex S , $\mathbf{i} = i_1 + i_2 + \dots + i_s$, $\mathbf{j} = j_1 + j_2 + \dots + j_s$, and \mathbf{a}_i and \mathbf{b}_j are respective Bernstein-Bezier coefficients of P_n and Q_n . We also give the needed expression by using the formula above.