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MACROELEMENTS AND ORTHOGONAL MULTITRRESOLUTIONAL 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:

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

where \( V_s \) is the volume of the \( s \)-dimensional simplex \( S \), \( i = i_1 + i_2 + \ldots + i_S \), \( j = j_1 + j_2 + \ldots + j_S \), and \( a_i \) and \( b_j \) are respective Bernstein-Bezier coefficients of \( P_n \) and \( A_n \). We also give the needed expression by using the formula above.