We define trimmed serendipity differential k-forms of order r on an n-cube \( C^n \) by

\[ S^k_r(\mathbb{C}^n) = P^k_r(\mathbb{C}^n) + J_1^0(\Lambda^r_n) + J_2^0(\Lambda^r_n). \]

**Theorem:** The degrees of freedom for \( S^k_r(\mathbb{C}^n) \) associated to a 0-dimensional sub-face \( f \) of \( C^n \), are

\[ u \to (|f| u) q, \quad q \in P_{r-2,0,4,4}(\Lambda^r_f) \oplus dH_{r-3,0,4,4}(\Lambda^{r-1}_f), \]

for any \( 0 \leq d \leq \min(n, r/2 + k) \).

**Theorem (Unisolvence):** \( S^k_r(\mathbb{C}^n) \) and all the degrees of freedom vanish, then \( n = 0 \).

**Dimension Count**

\[ \dim S^k_r(\mathbb{C}^n) = \dim P^k_r(\mathbb{C}^n) + \dim J_1^0(\Lambda^r_n) + \dim J_2^0(\Lambda^r_n). \]

Further, each summand has a closed-form expression in terms of binomial coefficients depending only on \( n, k, r \).

### References