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Cauchy Integral Decomposition
of Multi-Vector Valued Functions on Hypersurfaces

CMFT 5 No.1 (2005), 111–134. [ISSN 1617-9447]

Abstract. Let Ω be a bounded open and connected subset of \mathbb{R}^m which has a C_∞ -boundary Σ and let $F_k \in C_\infty(\Sigma)$ be a k -multi-vector valued function on Σ . Under which conditions can F_k be decomposed as $F_k = F_k^+ + F_k^-$ where F_k^\pm are extendable to harmonic k -multi-vector fields in Ω_\pm with $\Omega_+ = \Omega$ and $\Omega_- = \mathbb{R}^m \setminus \overline{\Omega}$? This question is answered by proving a set of equivalent assertions, including a conservation law on F_k and conditions on the Cauchy transform $\mathcal{C}_\Sigma F_k$ and on the Hilbert transform $H_\Sigma F_k$ of F_k .

Keywords. Clifford analysis, multi-vector valued functions, Cauchy transform, Hilbert transform.

2000 MSC. 30G35, 45B20.

Received. August 16, 2004.