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**Complete Function Systems and Decomposition Results Arising in Clifford Analysis**

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**Abstract.** For  $\Omega$  a sufficiently smooth unbounded domain in  $\mathbb{R}^n$  we develop a decomposition result for the Sobolev space  $W_{\mathcal{C}_{0,n}}^{p,l-1}(\Omega)$ . We also use modified Cauchy-Green type kernels to construct Clifford analytic-complete function systems in the generalized Bergman space  $B_{\mathcal{C}_{0,n}}^{p,l}(\Omega) := \ker D^l(\Omega) \cap W_{\mathcal{C}_{0,n}}^{p,l-1}(\Omega)$ , where  $D^l$  is the  $l$ -th iterate of the Dirac operator,  $l$  is a positive integer less than  $n$  and  $n/(n-l+1) < p < \infty$ . The modified Cauchy-Green kernels ensure that  $p$  lies in this range. Without the modification of the kernels one is restricted to a smaller range. These functions are used to approximate solutions of the equation  $\Delta^k u = 0$  with some boundary conditions and with  $2k < n$ . Some similar results are presented for sufficiently smooth unbounded domains lying in hyperbolas.

**Keywords.** Clifford Analysis, complete function systems, Bergman spaces, decomposition spaces, elliptic boundary value problems, Dirac operators and hyperbolas.

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