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integrally bounded. Suppose that at least one of the following conditions holds:

- (1) for each  $v$ , the pair  $(u, C_v)$  satisfies the condition (α);
- (2)  $a_0 \equiv 0$  and for each  $v$ , the pair  $(u, C_v)$  satisfies one of the conditions (α) – (γ).

Finally, set  $A := \cup_v C_v$  and assume that  $u$  is  $P$ -differentiable at each point of  $\Omega \setminus A$  and that  $Pu(x) = f(x)$  for any  $x \in \Omega \setminus A$ . Then  $Pu = f$  in the distribution sense on  $\Omega$ .

Let us finally note that, due to the non-commutativity of the Clifford algebra  $\mathcal{A}_n$  for  $n \geq 3$ , the results presented in this section are not in the most general form. For instance, one could consider the Clifford differentiation operator defined for ordered pairs of  $\mathcal{A}_n$ -valued functions  $(u, v)$  by

$$(u, v)' := \lim_{Q \downarrow a} \frac{1}{\lambda_n(Q)} \int_{\partial Q} u N v d\sigma ,$$

for which all our techniques apply as well (cf. also [He1, 2]). However, we leave the details of this matter to the interested reader.

#### REFERENCES

- [Bo] BOCHNER, S. Green-Goursat theorem. *Math. Z.* 63 (1955), 230-242.
- [BM] BOCHNER, S. and W.T. MARTIN. *Several Complex Variables*. Princeton Mathematical Series, Vol. 10, Princeton Univ. Press, Princeton, N.J., 1948.
- [BDS] BRACKX, F., R. DELANGHE and F. SOMMEN. *Clifford Analysis*. Pitman Adv. Publ. Program, 1982.
- [Cr] CRAVEN, B.D. A note on Green's theorem. *J. Austral. Math. Soc.* 4 (1964), 289-292.
- [Fe1] FEDERER, H. The Gauss-Green theorem. *Trans. Amer. Math. Soc.* 58 (1965), 44-76.
- [Fe2] —— A note on the Gauss-Green theorem. *Proc. Amer. Math. Soc.* 9 (1958), 447-451.
- [Fe3] —— *Geometric Measure Theory*. Springer-Verlag, Heidelberg, 1969.
- [G] GHEORGHIEV, G. L'évolution de la dérivée aréolaire en analyse hyper-complexe. *Stud. Math. Bulgarica* 11 (1991), 40-46.
- [Ha] HARRISON, J. Stokes' theorem for nonsmooth chains. *Bull. Amer. Math. Soc.* 29 (1993), 235-242.
- [HL] HENKIN, G.M. and J. LEITERER. *Theory of Functions on Complex Manifolds*. Monographs in Mathematics, Vol. 79, Birkhäuser Verlag, Basel-Boston-Stuttgart, 1984.
- [H] HENSTOCK, R. A Riemann type integral of Lebesgue power. *Canad. J. Math.* 20 (1968), 79-87.
- [He1] HESTENES, D. Multivector Calculus. *J. Math. Anal. Appl.* 24 (1968), 313-325.
- [He2] —— Multivector Functions. *J. Math. Anal. Appl.* 24 (1968), 467-473.

- [Hö] HÖRMANDER, L. *The Analysis of Linear Partial Differential Operators, Vol. 1.* Springer-Verlag, Berlin-Heidelberg-New York-Tokyo, 1983.
- [Ju1] JURCHESCU, M. *Introducere în analiza pe varietăți.* Tipografia Universității, București, 1980.
- [Ju2] —— On the Green-Riemann theorem. *An. Univ. București* 35 (1986), 25-33.
- [JN] JURKAT, W.B. and J.F. NONNENMACHER. The general form of Green's theorem. *Proc. Amer. Math. Soc.* 109 (1990), 1003-1009.
- [Ku] KURZWEIL, J. Generalized ordinary differential equations and continuous dependence on a parameter. *Czechoslovak Math. J.* 7 (1957), 418-446.
- [La] LANG, S. *Differentiable Manifolds.* Addison-Wesley, 1972.
- [Lo] LONDON, R.R. A new form of Green's theorem in the plane. *J. Math. Anal. Appl.* 126 (1987), 424-436.
- [L] LOOMAN, H. Über eine Erweiterung des Cauchy-Goursatsche Integralsatzes. *Nieuw Archief voor Wiskunde* 14 (1924), 234-239.
- [M1] MAWHIN, J. Generalized multiple Perron integrals and the Gauss-Goursat theorem for differentiable vector fields. *Czechoslovak Math. J.* 31 (1981), 614-632.
- [M2] —— Generalized Riemann integrals and the divergence theorem for differentiable vector fields. In: *E.B. Christoffel.* Birkhäuser-Verlag, Basel, 1981, 704-714.
- [Mi] MITREA, M. *Clifford Wavelets, Singular Integrals, and Hardy Spaces.* Springer-Verlag, Heidelberg, Lect. Notes Math. No. 1575, 1994.
- [Mo] MOISIL, G. Sur la généralisation des fonctions conjuguées. *Rendiconti della Reale Accad. Naz. dei Lincei* 14 (1931), 401-408.
- [MT] MOISIL, G. and N. TEODORESCU. Fonctions holomorphes dans l'espace. *Mathematica Cluj* 5 (1931), 142-150.
- [Pf1] PFEFFER, W.F. Une intégrale Riemannienne et le théorème de divergence. *C. R. Acad. Sc. Paris, Sér. I,* 299 (1984), 299-301.
- [Pf2] —— The divergence theorem. *Trans. Amer. Math. Soc.* 295 (1986), 665-685.
- [Pf3] —— The multidimensional fundamental theorem of calculus. *J. Austral. Math. Soc.* 43 (1987), 143-170.
- [Pf4] —— Stokes' theorem for forms with singularities. *C. R. Acad. Sci. Paris, Sér. I,* 306 (1988), 589-592.
- [Po1] POMPEIU, D. Sur la continuité des fonctions de variables complexes. *Annales de la Faculté des Sciences de Toulouse* 7 (1905), 264-315.
- [Po2] —— Sur une classe de fonctions d'une variable complexe. *Rendiconti del Circolo Matematico di Palermo* 33 (1912), 108-113.
- [Po3] —— Sur une définition des fonctions holomorphes. *C. R. Acad. Sci. Paris* 166 (1918), 209-212.
- [P] POTTS, D.H. A note on Green's theorem. *J. London Math. Soc.* 26 (1951), 302-304.
- [Sa] SAKS, S. *Theory of the Integral*, 2nd revised edition, Dover Publications, New York, 1964.
- [Sh1] SHAPIRO, V.L. On Green's theorem. *J. London Math. Soc.* 32 (1957), 261-269.
- [Sh2] —— The divergence theorem without differentiability assumptions. *Proc. Nat. Acad. Sci. U.S.A.* 43 (1957), 411-412.
- [Sh3] —— The divergence theorem for discontinuous vector fields. *Ann. of Math.* 68 (1958), 604-624.

- [Shi] SHIFFMAN, B. On the removal of singularities of analytic sets. *Mich. Math. J.* 15 (1968), 111-120.
- [Te] THÉODORESCO, N. La Dérivée Aréolaire. *Ann. Roumaine des Math.* 3, 1936.
- [Wh] WHITNEY, H. *Geometric Integration Theory*. Princeton Univ. Press, Princeton, 1957.
- [Zi] ZIEMER, W.P. *Weakly Differentiable Functions*. Springer-Verlag, New York, 1989.

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