Tunde Jakab* (tj8y@virginia.edu), Mathematics Department, Kerchof Hall, PO Box 400137, University of Virginia, Charlottesville, VA 22904-4137, Irina Mitrea, Mathematics Department, Kerchof Hall, PO Box 400137, University of Virginia, Charlottesville, VA 22904-4137, and Marius Mitrea, Mathematics Department, 330 Mathematical Sciences Building, University of Missouri, Columbia, MO 65211. Differential forms with mixed boundary conditions.
Let $\Omega \subset \mathbb{R}^{n}$ be a bounded Lipschitz domain, whose boundary decomposes into two disjoint pieces $\Sigma_{t}, \Sigma_{n} \subseteq \partial \Omega$, which meet at an angle $<\pi$. Denote by $\nu$ the outward unit normal to $\Omega$. Then there exists $\varepsilon>0$ with the property that if $|2-p|<\varepsilon$ then the following holds. Consider a vector field $u$ with components $u_{1}, \ldots, u_{n} \in L^{p}(\Omega)$ such that div $u=$ $\sum_{j=1}^{n} \partial_{j} u_{j} \in L^{p}(\Omega)$ and $\operatorname{curl} u=\left(\partial_{j} u_{k}-\partial_{k} u_{j}\right)_{1 \leq j, k \leq n} \in L^{p}(\Omega)$. Set $\nu \cdot u=\sum_{j=1}^{n} \nu_{j} u_{j}$ and $\nu \times u=\left(\nu_{j} u_{k}-\nu_{k} u_{j}\right)_{1 \leq j, k \leq n}$. Then the following are equivalent:
(i) $\left.(\nu \cdot u)\right|_{\Sigma_{t}} \in L^{p}\left(\Sigma_{t}\right)$ and $\left.(\nu \times u)\right|_{\Sigma_{n}} \in L^{p}\left(\Sigma_{n}\right)$;
(ii) $\nu \cdot u \in L^{p}(\partial \Omega)$;
(iii) $\nu \times u \in L^{p}(\partial \Omega)$.

This generalizes earlier work dealing with the case when $\Sigma_{t}=\emptyset$ or $\Sigma_{n}=\emptyset$. (Received August 19, 2008)

