Potential maps for de Rham complexes on Lipschitz domains

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On a domain which is starlike with respect to a ball, integral operators related to the classical Poincaré path integral serve as potential operators for de Rham complexes without boundary conditions, and the dual class generalizing Bogovskiĭ-type operators work for de Rham complexes with full Dirichlet boundary conditions. Such operators were intoduced by Mitrea, and further studied by Mitrea, Mitrea and Monniaux. In joint work with Costabel, we prove that these operators are pseudodifferential operators of order $-1$, and we thus obtain further regularity results for these de-Rham complexes, for example in Hardy spaces. For bounded Lipschitz domains, the same regularity results hold, and, moreover, the cohomology spaces can always be represented by smooth forms.

In recent work with Costabel and Taggart, we show that operators constructed by Chang, Krantz and Stein provide potential maps for de Rham complexes on unbounded special Lipschitz domains, and thus imply similar regularity results.