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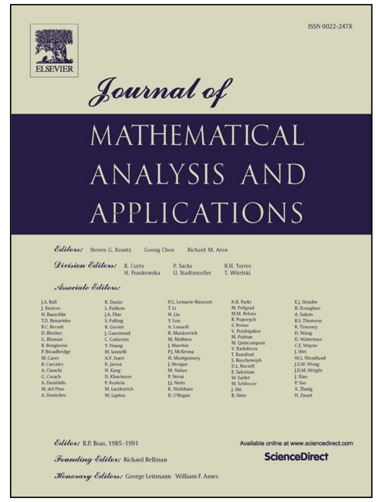

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Riesz-type inequalities for conjugate differential forms

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Abstract

We prove boundary inequalities for conjugate differential forms in C^1-domains. They extend the classical Riesz inequalities for conjugate harmonic functions.

Keywords:
Riesz inequalities, harmonic forms, conjugate differential forms, potentials on C^1-domains

1. Introduction

The following inequality due to M. Riesz [12], involving the real and the imaginary part of holomorphic functions of one complex variable, is very well known:

$$\|g\|_{L^p(S)} \leq C\|f\|_{L^p(S)}, \tag{1.1}$$

$(1 < p < \infty)$ the function $f + ig$ being holomorphic in the unit disc D, continuous up to the boundary $S = \partial D$, and $g(0) = 0$. Inequality (1.1) plays a key role in harmonic analysis.

Another inequality related to (1.1) concerns normal derivative $\frac{\partial}{\partial\nu}$ and tangential gradient $\mathrm{grad}_{\partial\Omega}$ of a harmonic function defined on a sufficiently smooth bounded domain $\Omega \subset \mathbb{R}^n$. Namely, we have

$$\left\|\frac{\partial\omega}{\partial\nu}\right\|_{L^p(\partial\Omega)} \leq C\|\mathrm{grad}_{\partial\Omega}\,\omega\|_{L^p(\partial\Omega)}, \tag{1.2}$$

for any harmonic function $\omega \in C^1(\overline{\Omega}) \cap C^2(\Omega)$. Inequality (1.2) was proved by Vishik [18] for $p = 2$ when $\partial\Omega$ is a sphere, conjectured by Mikhlin in [11,

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