## Thomas S. Angell; Ralph Ellis Kleinman; Josef Král Double layer potentials on boundaries with corners and edges

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## ANNOUNCEMENTS OF NEW RESULTS

## DOUBLE LAYER POTENTIALS ON BOUNDARIES WITH CORNERS AND EDGES

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We say that a bounded open set Dc.  $\mathbb{R}^3$  is rectangular if each point z in the boundary  $\exists D$  of D has a neighbourhood U c  $\exists D$  homeomorphic with  $\mathbb{R}^2$  such that U is contained in the three planes passing through z parallel to the coordinate planes. If  $z \in \exists D$  is not situated on an edge then n(z) denotes the unit exterior normal to D at z; otherwise n(z)=0 (= the zero vector in  $\mathbb{R}^3$ ). C( $\exists D$ ) stands for the space of all continuous functions on  $\exists D$  and H<sub>2</sub> denotes the surface measure on  $\exists D$ . For each  $f \in C(\exists D)$  the double layer potential

$$Wf(x) = (4\pi)^{-1} \int_{\partial D} f(z)n(z)(z-x)/|z-x|^3 dH_2(z)$$

is a narmonic function of the variable  $x \in \mathbb{R}^{2} \setminus \partial D$  admitting a continuous extension from D to  $\partial D: W_{i}f(z) = \lim_{\substack{x \to x \\ x \neq 0}} W_{i}f(x), z \in \partial D.$  $W_{i}: f \mapsto W_{i}f$  is a bounded linear operator acting on C( $\partial D$ ). Let us '

 $W_i:f \mapsto W_if$  is a bounded linear operator  $\stackrel{*}{acting}$  on  $C(\partial D)$ . Let us denote by  $\| \cdots \|$  the usual maximum norm, by I the identity operator, by Q the space of all compact linear operators on  $C(\partial D)$ . As shown in [1] J. Král and W. Wendland: Some examples concerning applica-

bility of the Fredholm-Radon method in potential theory, Aplikace matematiky 31(1986).

it may happen for simple rectangular sets that

 $\inf \{ \|W_i - \alpha I - T \| ; T \in Q \} / |\alpha| \ge 1$ 

for each value of the parameter  $\infty \neq 0$ . The ideas described in [1] together with some geometrical considerations permit to establish the following result.

Theorem. For each rectangular set D there is a norm p inducing the topology of uniform convergence on C( $\partial$ D) such that

2 inf  $p(W_i - \frac{1}{2}I - T)$ ; TeQ}<1.

This result has applications in connection with potentialtheoretic boundary value problems; it implies, in particular, that for each rectangular set D with a connected complement the corresponding operator  $W_i$  is invertible on C(  $\partial$ D) (cf.(11)).