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ON THE OBLIQUE DERIVATIVE PROBLEM IN AN INFINITE ANGLE

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Dedicated to Louis Nirenberg on the occasion of his 70th birthday

1. Introduction

Let $d_\vartheta \subset \mathbb{R}^2$ be the infinite angle of opening $\vartheta \in (0, 2\pi]$ with sides γ_0 and γ_1 given by

$$\gamma_0 = \{0 \le x_1 < \infty,\ x_2 = 0\},$$
$$\gamma_1 = \{x_1 = r\cos\vartheta,\ x_2 = r\sin\vartheta,\ 0 \le r = \sqrt{x_1^2 + x_2^2} < \infty\}$$

in a Cartesian coordinate system $\{x_1, x_2\}$. We consider the elliptic boundary value problem

$$\begin{gathered} -\Delta u + su = f(x), \quad x \in d_\vartheta, \\ \left(\frac{\partial u}{\partial n} + h_i \frac{\partial u}{\partial r}\right)\bigg|_{\gamma_i} = \varphi_i(r), \quad i = 0, 1, \end{gathered} \tag{1.1}$$

where n is the exterior normal to γ_i, h_0 and h_1 are given real constants, and s is a complex parameter with $\Re s \equiv a^2 \ge 0$.

Problem (1.1) arises from the parabolic initial-boundary value problem

$$\begin{gathered} v_t - \Delta v = f(x,t), \quad x \in d_\vartheta,\ t > 0, \\ v(x,0) = 0, \quad \left(\frac{\partial v}{\partial n} + h_i \frac{\partial v}{\partial r}\right)\bigg|_{\gamma_i} = \varphi_i(r,t), \quad i = 0, 1, \end{gathered} \tag{1.2}$$

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