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ON A BOUNDARY INTEGRAL METHOD FOR THE SOLUTION OF THE HEAT EQUATION IN UNBOUNDED DOMAINS WITH A NONSMOOTH BOUNDARY

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ABSTRACT. We study a boundary integral method for the solution of the heat equation in an unbounded domain D in $\mathbf{R}^2$. It is assumed that the boundary of D is a polygon $\Gamma = \partial D$ and that $\mathbf{R}^2 \setminus D$ is a simply connected domain. We use a method which was proposed by Chapko and Kress [**2**] for the case of a smooth bounded domain D and analyze this method in the presence of a boundary with corners.

1. Introduction. In this paper we study the numerical solution of the following initial value problem

$$(1.1) \qquad \begin{cases} u_t(x,t) = c\Delta u(x,t), & (x,t) \in D \times (0,T], \\ u(x,t) = F(x,t), & (x,t) \in \Gamma \times [0,T], \\ u(x,t) \overset{|x|\to\infty}{\longrightarrow} 0, & t \in [0,T], \\ u(x,0) = 0, & x \in D. \end{cases}$$

Here $D \subset \mathbf{R}^2$ is an unbounded domain and the boundary $\Gamma := \partial D$ is a polygon. We further assume that the constants c and T are greater than zero. The function F on the boundary should be sufficiently smooth (see Section 2) and should fulfill certain conditions at time $t = 0$, especially

$$(1.2) \qquad F(\cdot, 0) \equiv 0.$$

There are several ways to approximate the solution of (1.1) with the help of a boundary integral equation. One way would be to use a single

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