

## **$N$ -harmonic extensions of weighted integrable distributions**

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**Abstract.** We obtain  $n$ -harmonic extensions to the Cartesian product of  $n$  copies of the upper half-plane, of distributions in the weighted space  $w_1^2 \dots w_n^2 \mathcal{D}'_{L^1}$ , which is known to be the optimal space of tempered distributions that are  $S'$ -convolvable with a natural product domain version of the Poisson kernel.

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### **1. Introduction and notation**

The aim of this article is twofold. First, we solve the following boundary value problem: For each tempered distribution  $T$  in an optimal class, we find a  $n$ -harmonic function  $u(x_1, y_1; \dots; x_n, y_n)$  on the product space  $\mathbb{R}_+^2 \times \dots \times \mathbb{R}_+^2$  such that  $u$  converges to  $T$  in an appropriate sense when  $y_1, \dots, y_n \rightarrow 0^+$ . Let us recall that a complex valued function

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