

Optimal codomains for the Laplace operator and the product Laplace operator

Josefina Alvarez and Lloyd Edgar S. Moyo

(Communicated by Hans Triebel)

2000 Mathematics Subject Classification. 46F05, 46F10, 46F12.

Keywords and phrases. S' -convolution, Laplace operator and product Laplace operator, weighted distribution spaces.

Abstract. An optimal codomain for an operator $P(\partial)$ with fundamental solution E , is a maximal space of distributions T for which it is possible to define the convolution $E * T$ and thus to solve the equation $P(\partial)S = T$. We identify optimal codomains for the Laplace operator in the Euclidean case and for the product Laplace operator in the product domain case. The convolution is understood in the sense of the S' -convolution.

1. Introduction

Given a linear partial differential operator $P(\partial)$ with constant coefficients, the equation $P(\partial)S = T$ has always a solution for any distribution T with compact support. Indeed, a solution S is given as the convolution of the distribution T with a fundamental solution E of the differential operator. This convolution operator $T \rightarrow E * T$ becomes a two-sided inverse for the operator $P(\partial)$ in the space \mathcal{E}' of compact supported