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Pseudo-differential operator involving generalized Hankel–Clifford transformation

P. D. Pansare* and B. B. Waphare†

MIT Arts, Commerce and Science College
Alandi (D), Pune, India
**pradippansare@gmail.com*
†balasahebwaphare@gmail.com

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Pseudo-differential operators (p.d.os) involving generalized Hankel–Clifford transformation associated with the symbol $a(x, y)$ whose derivatives satisfy certain growth condition are defined and the Zemanian type function spaces $\mathbb{H}_\beta(I)$ and $\mathbb{S}_\alpha(I)$ are introduced. It is shown that p.d.o's are continuous linear map of the space $\mathbb{H}_\beta(I)$ and $\mathbb{S}_\alpha(I)$ into itself. Also an Integral representation of p.d.o is obtained.

Keywords: Pseudo-differential operator; generalized Hankel–Clifford transformation.

AMS Subject Classification: 47G30, 46F12

1. Introduction

The conventional Hankel transformation defined by

$$h_\mu\{f(x)\}(y) = \int_0^\infty \sqrt{xy} J_\mu(xy) f(x) dx \tag{1}$$

was extended by Zemanian [9] to certain generalized function of slow growth through a generalization of Parseval's equation. Later on [9] extended (1) to a class of generalized functions by the kernel method, which is more natural extention of (1). In Méndez *et al.* [2], the Hankel–Clifford transformations of order $\mu \geq 0$, defined by

$$(h_{1,\mu} f)(y) = y^\mu \int_0^\infty (xy)^{-\mu/2} J_\mu(2\sqrt{xy}) f(x) dx \tag{2}$$

and

$$(h_{2,\mu} f)(y) = \int_0^\infty x^\mu (xy)^{-\mu/2} J_\mu(2\sqrt{xy}) f(x) dx \tag{3}$$