ROCKY MOUNTAIN
JOURNAL OF MATHEMATICS
Volume 25, Number 4, Fall 1995

CONVOLUTION AND THE FOURIER-WIENER TRANSFORM ON ABSTRACT WIENER SPACE

IL YOO

ABSTRACT. In this paper we define the convolution of functionals on abstract Wiener space and establish the relationship between the Fourier-Wiener transforms of each functional and the Fourier-Wiener transform of their convolution. Also we obtain Parseval's and Plancherel's relation from the above relationship. The main results in a paper of Yeh then follow from our results as corollaries.

1. Introduction. In their papers [**1, 2**] Cameron and Martin introduced and established the existence of the Fourier-Wiener transform for certain classes of functionals on classical Wiener space. Further, they established an appropriate version of the formulas of Plancherel and Parseval. J. Yeh [**13**] also defined the convolution of functionals on classical Wiener space and proved the relationship between the Fourier-Wiener transforms of each functional and the Fourier-Wiener transform of their convolution. After that, Cameron and Storvick [**3**] defined an L_2 analytic Fourier-Feynman transform on Wiener space, and this concept was extended to L_p by Johnson and Skoug [**8**].

More recently, Y.J. Lee [**11**] extended the Fourier-Wiener transform on classical Wiener space to that on abstract Wiener space and applied this transform to differential equations on infinite dimensional spaces.

In this paper we define the convolution of functionals on abstract Wiener space and examine the relationship between the Fourier-Wiener transforms of each functional and the Fourier-Wiener transform of their convolution. Also we establish Parseval's relation and Plancherel's relation from the above relationship. The main results in [**13**] will then be corollaries of our results.

Received by the editors on June 16, 1993, and in revised form on December 23, 1993.
1991 *Mathematical Subject Classification.* Primary 28c20.
Key words and phrases. Abstract Wiener space, Fourier-Wiener transform, convolution.
This study was supported by Yonsei University Faculty Research Grant for 1995.