1. INTRODUCTION.

The Laplace transform

\[ L(f) = \int_{0}^{\infty} f(t)e^{-st}dt \quad (1.1) \]

is one of the most powerful tools of analysis. A complex inversion formula exists which allows us to make use of the theory of a complex variable to obtain asymptotic relations and expansions [1]. It is of theoretical interest to obtain an inversion formula which depends only on real value. Such a formula is furnished by the post-Widder inversion formula [2].

This formula is not useful computationally because the inverse is an unbounded operator. A great care has to be exercised and different methods have to be employed [3].

The usual method for establishing the post-Widder formula depends upon Laplace's asymptotic evaluation of an integral. Here we shall follow a different route which permits many generalizations.
2. **THE PARSEVAL-PLANCHEREL FORMULA.**

Let $F$ be the Fourier transform of $f$. Then we have

$$\int_0^\infty f(t)e^{-st}dt = \int_0^\infty \frac{f(x)}{s+ix} dx,$$

(2.1)

We see then that any linear operator which transforms $\frac{1}{1+ix}$ into $e^{-ixt}$ furnishes an inversion formula using the standard results for the inversion of the Fourier transform [4]. The post-Widder formula is one such transformation. In Widder's book, other transformations are given.

3. **GENERALIZATIONS.**

We see that there are several possible generalizations. In the first place, we can divide other transformations. In the second place, any orthogonal expansion has a Parseval relation. If we take the continuous analogue, we obtain an analogue of the Parseval-Plancherel formula. We thus have a method for obtaining inversion formulas for general transforms.

**REFERENCES**


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