# ON MEIJER TRANSFORM

BY

MAHENDRA KUMAR JAIN

*in Lucknow*

**1.** The integral equation

$$(1.1) \qquad h(p) = p \int_0^\infty e^{-px} g(x)\, dx$$

is symbolically denoted as

$$h(p) \doteq g(x),$$

and $h(p)$ is known as the Laplace transform of $g(x)$.

The inverse of (1.1) is given by

$$(1.2) \qquad g(x) = \frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} e^{px} \frac{h(p)}{p}\, dp.$$

Meijer [1] introduced the generalized Laplace transform

$$(1.3) \qquad F(s) = \int_0^\infty e^{-\frac{1}{2}st} (st)^{-k-\frac{1}{2}} W_{k+\frac{1}{2},m}^{(st)} f(t)\, dt$$

and its inverse

$$(1.4) \qquad f(t) = \lim_{\lambda\to\infty} \frac{1}{2\pi i} \cdot \frac{\Gamma(1-k+m)}{\Gamma(1+2m)} \int_{\beta-\lambda i}^{\beta+\lambda i} e^{\frac{1}{2}st} (st)^{k-\frac{1}{2}} M_{k-\frac{1}{2},m}^{(st)} F(s)\, ds,$$

where $M_{k,m}^{(z)}$ and $W_{k,m}^{(z)}$ are the two Whittaker functions. (1.3) and (1.4) are symbolically denoted as [2]

$$f(t) \xrightarrow[m]{k+\frac{1}{2}} \varphi(s),$$

where $\varphi(s) \equiv s F(s)$.

For $k = -m$ (1.3) and (1.4) reduce to (1.1) and (1.2), due to the identities

$$e^{-\frac{1}{2}st} \equiv (st)^{-m-\frac{1}{2}} W_{m+\frac{1}{2},m}^{(st)}$$

and

$$e^{\frac{1}{2}st} \equiv (st)^{-m-\frac{1}{2}} M_{-m-\frac{1}{2},m}^{(st)}.$$