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GENERATING RELATIONS OF GAUSS HYPERGEOMETRIC FUNCTION

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Abstract: By making use of familiar Laplace and inverse Laplace transform technique, we obtain generating functions involving Gauss and Kampé de Fériet hypergeometric functions. Certain special cases are also considered.

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1. Introduction

Let $(\lambda)_n$ denote the Pochhamer symbol

$$(\lambda)_n = \frac{\Gamma(\lambda+n)}{\Gamma(\lambda)} = \begin{cases} 1, & n=0, \\ \lambda(\lambda+1)\cdots(\lambda+n-1), & (n \in N). \end{cases} \tag{1.1}$$

and ${}_pF_q$ denote the generalized hypergeometric function

$${}_pF_q\left[\begin{matrix} a_1,\cdots,a_p & ; & \\ & & z \\ b_1,\cdots,b_q & ; & \end{matrix}\right] = \sum_{n=0}^{\infty} \frac{(a_1)_n\cdots(a_p)_n}{(b_1)_n\cdots(b_q)_n}\,\frac{z^n}{n!} \tag{1.2}$$

with p numerator and q denominator parameters.

By Kampé de Fériet's hypergeometric functions of two variables, we mean

$$F^{p:r;u}_{q:s;v}\left[\begin{matrix} \alpha_1,\cdots,\alpha_p & :\rho_1,\cdots,\rho_r & ;\lambda_1,\cdots,\lambda_u & ; & \\ & & & & x,y \\ \beta_1,\cdots,\beta_q & :\sigma_1,\cdots,\sigma_s & ;\mu_1,\cdots,\mu_v & ; & \end{matrix}\right]$$

$$= \sum_{m,n=0}^{\infty} \frac{(\alpha_1)_{m+n}\cdots(\alpha_p)_{m+n}\,(\rho_1)_m\cdots(\rho_r)_m\,(\lambda_1)_n\cdots(\lambda_u)_n}{(\beta_1)_{m+n}\cdots(\beta_q)_{m+n}\,(\sigma_1)_m\cdots(\sigma_s)_m\,(\mu_1)_n\cdots(\mu_v)_n}\,\frac{x^m}{m!}\,\frac{y^n}{n!} \tag{1.3}$$