

## Linear fractional differential equations for second kind modified Bessel functions

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**Abstract :** Fractional derivatives have been considered recently as a way to solve different problems in Engineering. In this way, second kind modified Bessel functions are considered here. The order  $\alpha$  fractional differential equations of second kind Bessel functions,  $K_\nu(x)$ , are studied with simple initial conditions. The Laplace transform and Caputo definition of fractional derivatives are considered. Solutions have been found for  $\nu=1/3, 1/2, 2/3, -1/3, -1/2$  and  $(-2/3)$ . In these cases, the solutions are the sum of two hypergeometric functions. The  $\alpha$  fractional derivatives have been for  $\alpha=1/3, 1/2$  and  $2/3$ , and the above values of  $\nu$ . No convergence has been found for the integer values of  $\nu$ . Furthermore when  $\alpha$  has been considered as a rational found  $m/p$ , no general solution has been found. Clearly, this case is more difficult to treat than those of first kind Bessel Function.

**Keywords :** Caputo, modified Bessel functions, hypergeometric, linear fractional differential equations, transform Laplace

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