

Extended Hypergeometric Matrix Functions

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The main aim of this article is to study a new generalizations of the Gauss hypergeometric matrix and confluent hypergeometric matrix functions by using 2-parameter Mittag-Leffler matrix function. In particular, we investigate certain important properties of these extended matrix functions such as integral representations, differentiation formulas, Beta matrix transform and Laplace transform.

References

- [1] Ata, E.; Kıymaz, İ.O., A study on certain properties of generalized special functions defined by Fox-Wright function. *Applied Mathematics and Nonlinear Sciences* **2020**, *5(1)*, 147-162.
- [2] Şahin, R.; Yağcı, O.; Yağbasan, M.B.;Kıymaz, İ.O.; Çetinkaya, A., Further generalizations of gamma, beta and related functions, *Journal of Inequalities and Special Functions* **2018**, *9(4)*, 1-7.
- [3] Çetinkaya, A.;Kıymaz, İ.O.; Agarwal, P.;Agarwal, R., A comparative study on generating function relations for generalized hypergeometric functions via generalized fractional operators, *Advances in Difference Equations* **2018**, *1*, 1-11.
- [4] Bas, E., and Acay, B. The direct spectral problem via local derivative including truncated Mittag-Leffler function. *Applied Mathematics and Computation* **2020**, *367*, 124787.
- [5] Yilmazer, R., and Bas, E. Fractional solutions of a confluent hypergeometric equation. *Journal of the Chungcheong Mathematical Society* **2012**, *25(2)*, 149-149.
- [6] Hammouch, Z., and Mekkaoui, T. Control of a new chaotic fractional-order system using Mittag-Leffler stability. *Nonlinear Stud* **2015**, *22(4)*, 565-577.
- [7] Veerasha, P., Prakasha, D. G., and Hammouch, Z. An efficient approach for the model of thrombin receptor activation mechanism with Mittag-Leffler function. In The International Congress of the Moroccan Society of Applied Mathematics, **2019**, (pp. 44-60). Springer, Cham.
- [8] Uçar, S., Özdemir, N., and Hammouch, Z. A fractional mixing propagation model of computer viruses and countermeasures involving mittag-leffler type kernel. In International Conference on Computational Mathematics and Engineering Sciences, **2019**, (pp. 186-199). Springer, Cham.
- [9] Jódar, L.; Cortés, J.C., Some Properties of Gamma and Beta Matrix Functions. *Appl. Math. Lett.* **1998**, *2(1)*, 89-93.

- [10] Jódar, L.; Cortés, J.C., On the hypergeometric matrix function. *J. Comput. Appl. Math.* **1998**, *99*, 205–217.
- [11] Metwally, M. S., On p-Kummer's Matrix Function of Complex Variable Under Differential Operators and Their Properties. *Southeast Asian Bull. Math.* **2011**, *35*(2).
- [12] Wehowar, G., and Erika H., The second Kummer function with matrix parameters and its asymptotic behaviour., *Abstract and Applied Analysis*. Vol. 2018. Hindawi, 2018.
- [13] Çekim, B., Generalized Euler's beta matrix and related functions, *AIP Conference Proceedings, American Institute of Physics*, **2013**, *1558*(1), 1132–1135.
- [14] Abdalla, M., and Bakhet, A. Extended Gauss hypergeometric matrix functions., *Iran. J. Sci. Technol. Trans. A Sci.* **2018**, *42*(3), 1465–1470.
- [15] Verma, A., and Dwivedi, R., On the matrix version of new extended Gauss, Appell and Lauricella hypergeometric functions., *arXiv preprint arXiv:2108* **2018**, 11310.
- [16] Goyal, R.; Agarwal, P.; Oros, G.I.; Jain, S. Extended Beta and Gamma Matrix Functions via 2-Parameter Mittag-Leffler Matrix Function. *Mathematics* **2022**, *10*, 892.
- [17] Abdalla, M.; Bakhet, A. Extension of Beta matrix function. *Asian J. Math. Comput. Res.* **2016**, *9*, 253-264.
- [18] Garrappa, R.; Popolizio, M. Computing the matrix Mittag-Leffler function with applications to fractional calculus. *J. Sci. Comput.* **2018**.
- [19] Bakhet, A., On Some Topics of Special Functions of Complex Matrices, M. Sc. thesis, Al-Azhar University, Assiut, Egypt, 2015.
- [20] Debnath, L. and Bhatta, D., Integral transforms and their applications. Chapman and Hall/CRC, 2016.