

HIGHER ORDER NICKEL FIBONACCI NUMBERS AND SOME SYMBOLIC COMPUTATIONS

Mücahit AKBIYIK^{1,*}, Seda YAMAÇ AKBIYIK²

¹Istanbul Beykent University, Faculty of Engineering and Architecture, Department of Computer Engineering, Istanbul-Türkiye

²Istanbul Topkapı University, Faculty of Engineering, Department of Electric-Electronic Engineering, Istanbul-Türkiye

ABSTRACT

In this presentation, we first define higher-order Nickel Fibonacci numbers. We then examine the algebraic properties of higher-order Nickel Fibonacci numbers. Finally, we construct higher-order Nickel Fibonacci matrices and study their algebraic properties. In addition, we will develop symbolic computations in MATLAB to support and illustrate the theoretical results.

Funding: This research project has been submitted to the Scientific Research Projects Coordination Unit of Istanbul Topkapı University (Project No: GAP-2026-008).

Keywords Higher Order Nickel Fibonacci Numbers · Higher Order Nickel Fibonacci Matrices · Symbolic Computations

References

- [1] Akbiyik, M., Alo, J. On Third-Order Bronze Fibonacci Numbers, *Mathematics*, 9(20), 2606, 2021.
- [2] Akbiyik, S. Y. The third order Nickel Fibonacci numbers, *Logic Journal of the IGPL*, 33(6), 2023.
- [3] ElGamal, T. A public key cryptosystem and a signature scheme based on discrete logarithms, *IEEE Transactions on Information Theory*, 31(4), 469–472, 1985.
- [4] Falcon, S., Plaza, A. On the Fibonacci k-numbers, *Chaos, Solitons, Fractals*, 32(5), 1615–1624, 2007.
- [5] Gould, H. W. A history of the Fibonacci Q-matrix and a higher-dimensional generalization, *The Fibonacci Quarterly*, 19(3), 250–257, 1981.
- [6] Hill, L. S. Cryptography in an algebraic alphabet, *The American Mathematical Monthly*, 36(6), 306–312, 1929.
- [7] Kilic, E. Tribonacci sequences with certain indices and their sums, *Ars Combinatoria*, 86, 13–22, 2008.
- [8] Kilic, E., Tasci, D. On the generalized order-k Fibonacci and Lucas numbers, *Rocky Mountain Journal of Mathematics* 36(6), 2006.
- [9] Koblitz, N. *A Course in Number Theory and Cryptography*, Springer-Verlag, New York, 1994.
- [10] Koshy, T. *Fibonacci and Lucas Numbers with Applications*, John Wiley and Sons, 2001.
- [11] Menezes, A. J., van Oorschot, P. C., Vanstone, S. A. *Handbook of Applied Cryptography*, CRC Press, 1996.
- [12] Shannon, A. G. Iterated Fibonacci sequences, *The Fibonacci Quarterly*, 15(2), 110–112, 1977.

*Corresponding Author's E-mail: mucahitakbiyik@beykent.edu.tr