On some properties and applications of Horadam sequences

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Abstract

The Horadam sequence is a generalization of the Fibonacci numbers in the complex plane, depending on a family of four complex parameters: two recurrence coefficients and two initial conditions. The necessary and sufficient periodicity conditions formulated in [1] are used to enumerate all Horadam sequences with a given period [2]. The geometry of periodic orbits is analyzed, where regular star-polygons, bi-partite digraphs and multi-symmetric patterns are recovered. A number of periodic and non-periodic Horadam patterns are presented (convergent, divergent or dense), along with a Horadam-based pseudo-random generator [3]. Periodicity conditions for generalised Horadam sequences (produced by higher order recurrences) are also formulated [4].

References.

[1] O. Bagdasar and P. J. Larcombe, On the characterization of periodic complex Horadam sequences, *Fibonacci Quart* **51 (1)** (2013) 28-37.

[2] O. Bagdasar and P. J. Larcombe, On the number of complex Horadam sequences with a fixed period, *Fibonacci Quart* **51 (4)** (2013) 339-347.

[3] O. Bagdasar and M. Chen, A Horadam-based Pseudo-Random Number generator, *Proceedings of 16th UKSim - Cambridge*, (2014) 226-230.

[4] O. Bagdasar and P. J. Larcombe, On the characterization of periodic generalized complex Horadam sequences, *J Differ Equ Appl*, **20**, (2014) 1069-1090.