New stability conditions for linear delay difference equations

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The Bohl-Perron result on exponential dichotomy for a linear difference equation

$$x(n+1) - x(n) = -\sum_{l=1}^{m} a_l(n) x(h_l(n)), \ \ h_l(n) \leq n,$$

states (under some natural conditions) that if all solutions of the non-homogeneous equations with a bounded right hand side are bounded, then the relevant homogeneous equation is exponentially stable. According to its corollary, if a given equation is *close* to an exponentially stable comparison equation (the norm of some operator is less than one), then the considered equation is exponentially stable.

For a difference equation with several variable delays and coefficients we obtain new exponential stability tests using the above results, representation of solutions and comparison equations with a positive fundamental function.

Main results of the talk where published in [1].

References

[1] Leonid Berezansky, and Elena Braverman, Elena, *'New stability conditions for linear difference equations using Bohl-Perron type theorems*, Journal of Difference Equations and Applications **17: 5** (2011), 657–675.