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H Sedaghat* (hsedagha@vcu.edu), Department of Mathematics, Virginia Commonwealth University, Box 842014, Richmond, VA 23284-2014. *Uncovering fundamental properties of difference equations by semiconjugate factorization.*

It is often possible to gain substantial insight into the nature of a higher order difference equation and the behavior of its solutions by analyzing its structure of the equation itself and uncovering hidden symmetries in its form. I use the method of semiconjugate factorization to decompose a difference equation of order two or greater into a triangular system of two lower order equations. Then apply this method to linear difference equations and, time-permitting some nonlinear ones as well. In the linear case, the above method casts new light on familiar concepts such as eigenvalues and the role of the homogeneous part in obtaining a solution. It also adds new information, e.g., on the role of the discrete Riccati equation as a catalyst for possible decompositions of linear equations on a given algebraic field. (Received September 17, 2010)