1052-39-26 **Harry Gingold*** (gingold@math.wvu.edu), WVU, Department of Mathematics, Armstrong Hall, Morgantown, WV 26506. *COMPACTIFICATION AND BLOW UP OF SOLUTIONS IN NONLINEAR FINITE DIFFERENCE SYSTEMS.* Preliminary report.

Abstract. Nonlinear systems of difference equations are studied via a new compactification method that distinguishes among different directions at infinity. This compactification transforms a polynomial system in , to a rational system inside the unit ball. On the unit ball, of the compactified system, a family of solutions that correspond to ideal solutions of the original polynomial equation in is defined. The compactification allows us to define critical points at infinity. The critical points at infinity lead to a nonlinear eigenvalue problem. If a critical point on the boundary of the compactified system is "hyperbolic", then the original system is expected to possess solutions that blow up. A naive expectation that the Jacobian, about a point y= of any polynomial difference system, solely depends on the highest degree non linear terms of , is shown to be false. (Received July 14, 2009)