

1065-37-161

Robert M Spann* (bobspann@gmail.com), 3001 Veazey Terrace, NW, Apt. 802, Washington, DC 20008. *Newton Maps for Complex Polynomials with Complex Exponents.*

Newton's method is one of the most widely used methods for finding roots of non linear equations. Numerous authors have also applied the Newton iteration function, or Newton Map, to functions of a complex variable to obtain images. This paper extends that body of work to polynomials with complex exponents. I obtain images by iterating the Newton Map of complex polynomials such as $Z^\lambda - \rho = 0$ where Z is a complex variable, ρ a complex number, $\lambda = n + mi$, n, m are integers. Complex integer exponents, instead of real integer exponents, changes the Newton Map and hence the images that are obtained. Complex polynomials of the form $Z^{mi} - \rho = 0$ will have either a (countably) infinite number of roots or no roots in the complex plane. It is well known that infinity is a repelling fixed point for Newton Maps of complex polynomials with real exponents. There are infinitely many attracting fixed points in any neighborhood of infinity for Newton Maps of complex polynomials of the form $Z^{mi} - \rho = 0$. These differences, as well as other differences between Newton Maps of complex polynomials with complex, as opposed to real, exponents and the impacts on the images obtained are discussed. (Received September 12, 2010)