Newton’s method is a very well-known process for finding roots of a function $f$ using the iterative formula $z_{n+1} = z_n - \frac{f(z_n)}{f'(z_n)}$. The associated function $F(z) = z - \frac{f(z)}{f'(z)}$ is called the Newton map for $f$.

Newton maps of polynomials have been an object of study for a considerable time, but far less is known about the Newton maps of rational functions. We will describe those rational functions whose Newton maps are conjugate by Möbius transformations to quadratic polynomials and prove that there are no Newton maps of rational functions which are conjugate to $z^3$. (Received July 27, 2018)