1154-VM-2387 **Danqi Yin*** (`dyin@coe.edu`), 1220 1st Ave NE, Cedar Rapids, IA 52402, and **Brittney Miller**.
Classifying solutions for an important functional equation in Complex Analysis.

Let $\varphi : \mathbb{D} \to \mathbb{D}$ be a non-constant rational map in the Hardy space, and let C_φ act on act on the Hardy space. Set $\sigma(z) = \dfrac{1}{\varphi^{-1}(\sqrt{z})}$, $\psi(z) = \dfrac{z\sigma\prime(z)}{\sigma(z)}$, and $\varphi(\infty) = \lim\limits_{|z|\to\infty} \varphi(z)$. Then,

$$(C_\varphi^* f)(z) = \frac{f(0)}{1-\varphi(\infty)z} + \sum \psi(z) f(\sigma(z))$$

where the sum is taken over the branches of σ. The kernel of C_φ^* is a subset of H^2 such that if $f \in ker(C_\varphi^*)$, then $C_\varphi^*(f) = 0$. It is very important but also turns out to be very hard to classify the kernel of C_φ^*. According to the previous research, the following functional equation point out a possible way to classify the kernel of C_φ^*.

$$U(z)f(z) + zU'(z)f(U(z)) = 0$$

U is always represented by one of following 5 forms: $-z$, $\dfrac{m}{z}$, $m - z$, $\dfrac{-z}{1+mz}$, $\dfrac{-m+z}{1+tz}$, where $m, t \in \mathbb{R}$ and $m \neq 0, t \neq 0$. To classify the kernel of C_φ^*, the research was conducted to investigating the solutions of each case of u for the functional equation. (Received September 17, 2019)