A Characterization of Refinable Rational Functions

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Abstract

In recent decades, refinable functions have become increasingly popular due to their desirable properties in many applications. Rational functions, however, are not as well-behaved as some other classes of functions and have seemingly escaped notice in terms of refinability. The authors spent the summer of 2006 investigating the refinability of rational functions while attending the NSF funded REU at Texas A&M University. Preliminary simplifications to the general case are presented in a chronological collection of lemmas. A complete characterization of refinable rational functions follows with an interesting connection to an open problem in number theory.