

Sums of Squares and Wavelet Frame Generators

Cameron Farnsworth¹ and Youngmi Hur¹

1) *Department of Mathematics, Yonsei University, Seoul, KOREA*

Corresponding Author : Cameron Farnsworth, farnsworth.research@gmail.com

ABSTRACT

The study of non-negative polynomials has a rich history. It is clear that polynomials which are sums of squares are non-negative. Hilbert showed in 1889 that there exist polynomials in dimension 2 or greater which are non-negative yet which are not sums of squares and the study of the differences between the sets of sums of squares polynomials and non-negative polynomials has been rich since. While the study of wavelets is largely from an analytic view point, it is highly interesting when algebraic and algebraic geometric connections arise. One such connection is through sums of squares or through sums of square magnitudes decompositions of non-negative Laurent polynomials.

This talk will review the history of sums of squares and sums of magnitude square problems. We will discuss the Oblique Extension Principle and a specialization of this called the Unitary Extension Principle which establish a connection between sums of square magnitude problems and wavelet frame generators.