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UNIVALENT FUNCTIONS AND FREQUENCY ANALYSIS

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Dedicated to Professor William B. Jones on the occasion of his 70th birthday

ABSTRACT. The purpose of this article is to introduce an idea to an alternative method for solving the frequency analysis problem by using univalent functions. The method represents a bridge between univalent functions and frequency analysis. More specifically we want to present a way of using star-like functions in solving the frequency analysis problem.

1. Introduction. The frequency analysis problem is the problem of determining the unknown frequencies ω_j and amplitudes α_j in a trigonometric signal $x_N(m)$. The signal values from N observations are known.

An established method for solving the problem (with roots back to Wiener and Levinson) may be roughly described in the following way: From the signal values a certain absolutely continuous measure on the unit circle is constructed. This gives rise to an inner product, and in turn to moments and monic orthogonal polynomials (Szegö-polynomials) on the unit circle. Asymptotic values of some zeros of the polynomials then lead to the frequencies.

The methods (variations obtained by different choices of measures or modification of moments) are dealt with in [**2**]–[**4**], [**6**]–[**9**]. Throughout this article these methods all together will be referred to as the "Szegö polynomial method."

The purpose of this article is to introduce an alternative method to solve the problem by using a bridge between univalent functions and frequency analysis. More specifically we want to present a way of using star-like functions in solving the frequency analysis problem.

We begin with some definitions.

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