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Application of Quadruple Symmetric Real Function Spectral Properties in Engineering Sciences

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Abstract. The spectral properties of quadruple symmetric real functions are analyzed in the study. Six number theorems are formulated and proofed analytically in a capacity of central results of the research. Lasted theorem could be used to construct of complex Fourier spectrum for arbitrary real function by even – odd decomposition. The theorem is illustrated numerically. The initial signal with length N (analogous values length interval or number of discrete samples) in the time domain is Fourier transformed through two spectral - real and imaginary parts with length N in the frequency domain. The real and imaginary parts of the complex Fourier spectrum of the initial signal, could be obtained by procedure, described in the study. Spectral parts could be calculated by equivalent functions. Event left and odd right equivalent functions contents N/2 nonzero analogous values or discrete samples. This strategy allows constructing of the complex Fourier spectrum of the initial signal with length N in the time domain base on equivalent real and imaginary spectral parts with length N/2 in the frequency domain. The study could be thought of as an extension and resume of AMC 221(2013) pp. 344-350 and of "Quadruple Symmetric Real Signals Spectral Even and Odd Decomposition", Building Materials and Structures, UDK: 624.9.042.7, 699.841, doi: 10.5937/grmk1603003M, N3 2016. Some numerical examples and applications of quadruple symmetric real function spectral properties in the engineering sciences are presented in the study.